→ Rick Brown

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

February 3, 1999

Ref: 8EPR-SR

Howard Roitman, Director
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Re: Argo Tunnel Treatment Plant
ARAR Compliance Document

Dear Mr. Roitman:

Please find enclosed EPA's Argo Tunnel Treatment Plant ARAR Compliance Document (ACD) and response to comments received during the public comment period. The document specifies the discharge limits, monitoring and reporting requirements EPA believes are necessary to comply with *applicable or relevant and appropriate requirements* (ARARs) at the Argo Tunnel Treatment plant, and to assess performance of the remedial action under EPA's cooperative agreement with the State. There are four sections in the ACD: (1) Rationale; (2) Limits and Requirements; (3) Tables; (4) Response to Comments.

EPA is issuing the ACD after several years of discussions with State staff, as we believe it is very important to have in place formally established performance requirements for operation of the mine drainage treatment plant at the Argo Tunnel. We have begun the process of seeking EPA Headquarters concurrence on the manganese ARAR waiver for the reasons set forth in the ACD. We understand the State's remaining concerns about the ARARs, but it does not appear that these issues can be resolved in the near future.

The completion of this document has been delayed for about a year because of plant start-up problems and contractual difficulties which were of higher priority. The ARARs issues discussed above have also held up issuance. Because of this delay, many of the compliance dates have already past. However, operations at the treatment plant have been generally following the document for some time, even though the document was not in effect. The plant has been achieving the final discharge limits since October 1998.

If you have any questions about the ARAR Compliance Document please contact me or Dana Allen at (303) 312-6870.

Sincerely,

Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation

Enclosures

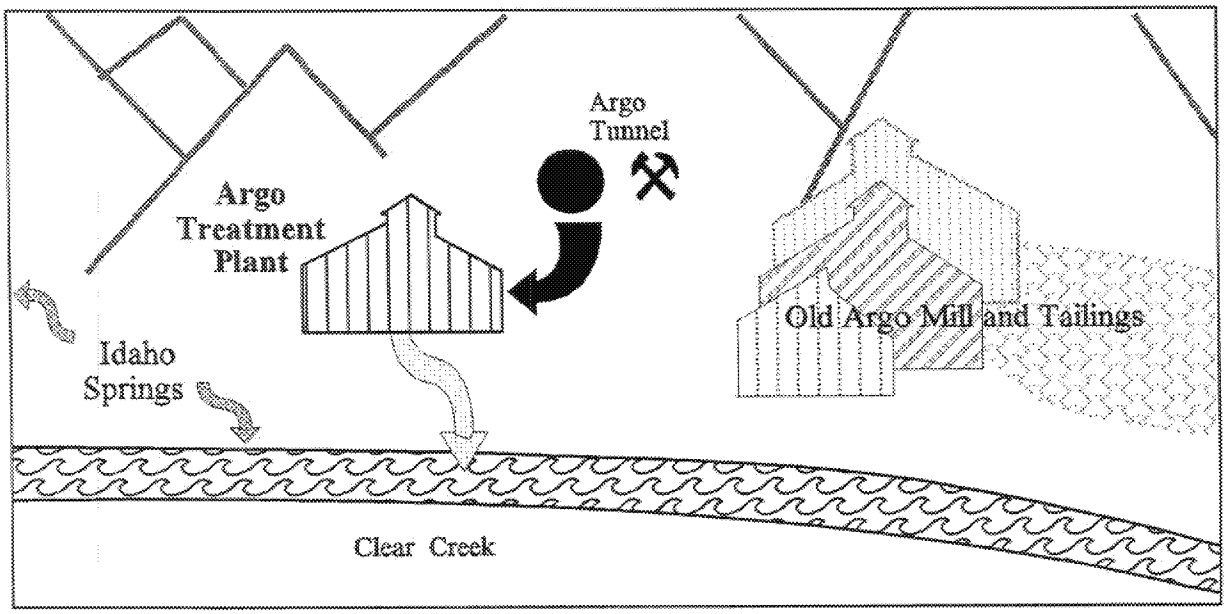
cc: Vicki Coppage, City of Golden
UCCWA
Holly Huyck, UCCWAG
Rich Brown, CDPHE
Ron Abel / Mary Scott, CDPHE
Rob Eber, AG Office

CLEAR CREEK/CENTRAL CITY SUPERFUND SITE
ARGO TUNNEL TREATMENT PLANT
IDAHO SPRINGS, COLORADO

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS COMPLIANCE DOCUMENT

PART 1 - APPLICATION OF ARARS
PART 2 - DISCHARGE CONTROL MECHANISM

February 1, 1999



ARGO TUNNEL WATER TREATMENT PLANT
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS COMPLIANCE DOCUMENT

Summary - ARARs Compliance Document

The *Applicable or Relevant and Appropriate Requirements (ARAR) Compliance Document* outlines the discharge limits that will need to be met by the new Argo Tunnel Treatment Plant. Acid mine drainage from the Argo Tunnel will be treated by the plant to remove metals resulting in improved water quality in Clear Creek. Prior to starting the treatment plant, the tunnel has been discharging over 700 pounds per day of heavy metals into Clear Creek.

This document applies the requirements of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA or more commonly Superfund), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and Superfund - Applicable or Relevant and Appropriate Requirements (ARAR).

The document is divided into two parts; the Application of ARARs (Statement of Basis) and the Discharge Control Mechanism (DCM). Application of ARARs, Part I, explains: (1) which ARARs apply to the treatment plant, (2) how the ARARs are implemented, (3) outlines how compliance with ARARs will be determined, and (4) identifies other information that EPA and the State will need for evaluating treatment performance. Part II, the discharge control mechanisms, specifies the limits, monitoring and reporting that will be needed to ensure compliance with ARARs, and document plant performance and water quality.

Table of Contents

Background

Clear Creek Superfund Site History:

The Clear Creek/Central City Superfund Site is located on the east slope of Colorado's Front Range. The Colorado Mineral Belt transects the Site. The rich mineralization of the area is the source of sulfide ores which contain deposits of several metals including gold, silver, iron, copper lead, nickel, zinc, cadmium, manganese, as well as others.

Due to the rich mineralization of the area, portions of the site became some of the most heavily mined areas of Colorado. There are well over 800 inactive mines and tunnels in Clear Creek and Gilpin Counties. Historically, it is estimated that over $110 million worth of mineral production, in "1900" dollars, occurred at the Site. Gold and silver accounted for the vast majority of the mining interest.

Mining activity in the area commenced in 1859 with placer gold being found at the mouth of Chicago Creek, and, and the first lode discovery occurring in Gregory Gulch later that year. By the summer of 1860, almost all surface lodes had been claimed.

Extraction of surface ores led to an increase in the depth of mining. Tunneling brought problems with water drainage, and miners began to encounter more durable sulfide ores which could not be milled with the same ease as the oxidized surface ores. To compensate for these problems, drainage tunnels were constructed and new milling techniques were developed.

The tunnels and new milling techniques opened much of the mineralized area to oxygen and water creating continuing releases of heavy metal pollution. Sulfide ore when exposed to air, water and bacteria starts oxidizing, generating acid mine drainage and dissolving heavy metals. Once started, the oxidation reaction usually continues for many hundreds of years. The ongoing heavy metals releases from acid mine drainage and old tailings piles prompted EPA to list the historic mining areas of Clear Creek and Gilpin County as a Superfund site.

In May 1980, there was also a "blowout" of the Argo Tunnel. A blowout is a sudden gush of water and debris from a mine tunnel usually caused by the build up and eventual release of water trapped behind debris dams inside the tunnel. Acidic and metal-laden water and sediment from the Argo Tunnel blowout contaminated Clear Creek for many miles downstream of Idaho Springs. Coors Brewing Company and several municipalities who rely on Clear Creek for drinking water and industrial uses had to shut off their water intakes for approximately two days.

Based on the continuing releases of heavy metals and the Argo blowout, the U.S. Environmental Protection Agency (EPA) placed the Clear Creek/Central City Superfund Site (the Site) on the National Priorities List in 1983. The Site consists of a number of "priority locations" scattered over the Clear Creek watershed. The priority locations are the "worst actors" when it comes to impacts on Clear Creek.

Argo Tunnel History:

One of the Superfund priority locations is the Argo Tunnel, located in Idaho Springs, Clear Creek County, Colorado (see Figure 1). The 4.2-mile long tunnel was driven between 1893 and 1910 so that gold mines in the area above the tunnel would be drained of water. The tunnel was also used to haul ore out of the mines. The tunnel has not been used for mining since 1943.

The Argo Tunnel drains hundreds of mines between Idaho Springs and Central City, Colorado. Currently, the Argo Tunnel drains mine water from old mines and the mountains above it at an average rate of 200 gallons per minute. However, during spring run off and periods of prolonged precipitation, the discharge rate can increase substantially. Large flows can also occur when portions of old mine workings collapse. The water is acidic with a pH ranging between two and three standard units. The drainage adds more than 700 pounds of metals per day into Clear Creek. This represents approximately one third of the total metals loading to Clear Creek. The effluent is toxic to aquatic life in Clear Creek.

EPA began a Remedial Investigation (RI) of the Clear Creek/Central City Site in June 1985. This RI focused on acid mine drainage from five abandoned mine tunnels near the cities of Idaho Springs, Black Hawk, and Central City and the influences of acid mine drainage from those tunnels on adjacent streams. The study was considered Operable Unit #1 (OU1) for the Site. The Argo Tunnel was one of the five tunnels investigated during the OU1 RI. The OU1 Record of Decision (ROD) was issued on September 30, 1987. The OU1 ROD chose treatment of the drainages from the five tunnels using constructed wetlands if it could be shown through a period of research that constructed wetlands were cost-effective and could consistently and effectively remove metals from mine drainage.

In June 1988, EPA transferred the lead role for the Site to the Colorado Department of Public Health and Environment (CDPHE). CDPHE completed what was called the Phase II RI in September 1990. The Phase II RI identified and ranked additional sources of contamination to Clear Creek. The Phase II Feasibility Study (FS), which was completed in September 1991, evaluated different options for addressing this contamination. The Phase II ROD, also called the OU3 ROD, was signed on September 30, 1991. For the Argo Tunnel discharge, the decision was made in the OU3 ROD to supersede the OU1 ROD and treat the Argo Tunnel water using a chemical precipitation plant versus the constructed wetland remedy selected in the OU1 ROD. This was because subsequent research had revealed that the constructed wetlands would not likely be effective on discharge rates as great as the Argo Tunnel. Also, in the OU3 ROD, EPA and CDPHE selected the option of pumping contaminated ground water from the mouth of nearby Virginia Canyon and treating it at the Argo Tunnel treatment plant if the ground water could be captured. Initial investigations of the ground-water system in Virginia Canyon indicated that the ground water cannot be easily collected. At this time, Virginia Canyon ground water will not be treated. However, the plant was designed to allow easy expansion, if other ground water collection options can be developed.

In September 1993, CDPHE began designing the Argo Tunnel water treatment plant. Construction of the plant was completed in January 1998. After a difficult start up, the plant has been operating full time since April 1, 1998. The treatment is a sodium hydroxide metal precipitation process which produces a high density sludge. The plant was designed with dual train treatment units which together can treat up to 700 gallons per minute of water. During normal flow rates (200 gpm) only one treatment train will be operated.

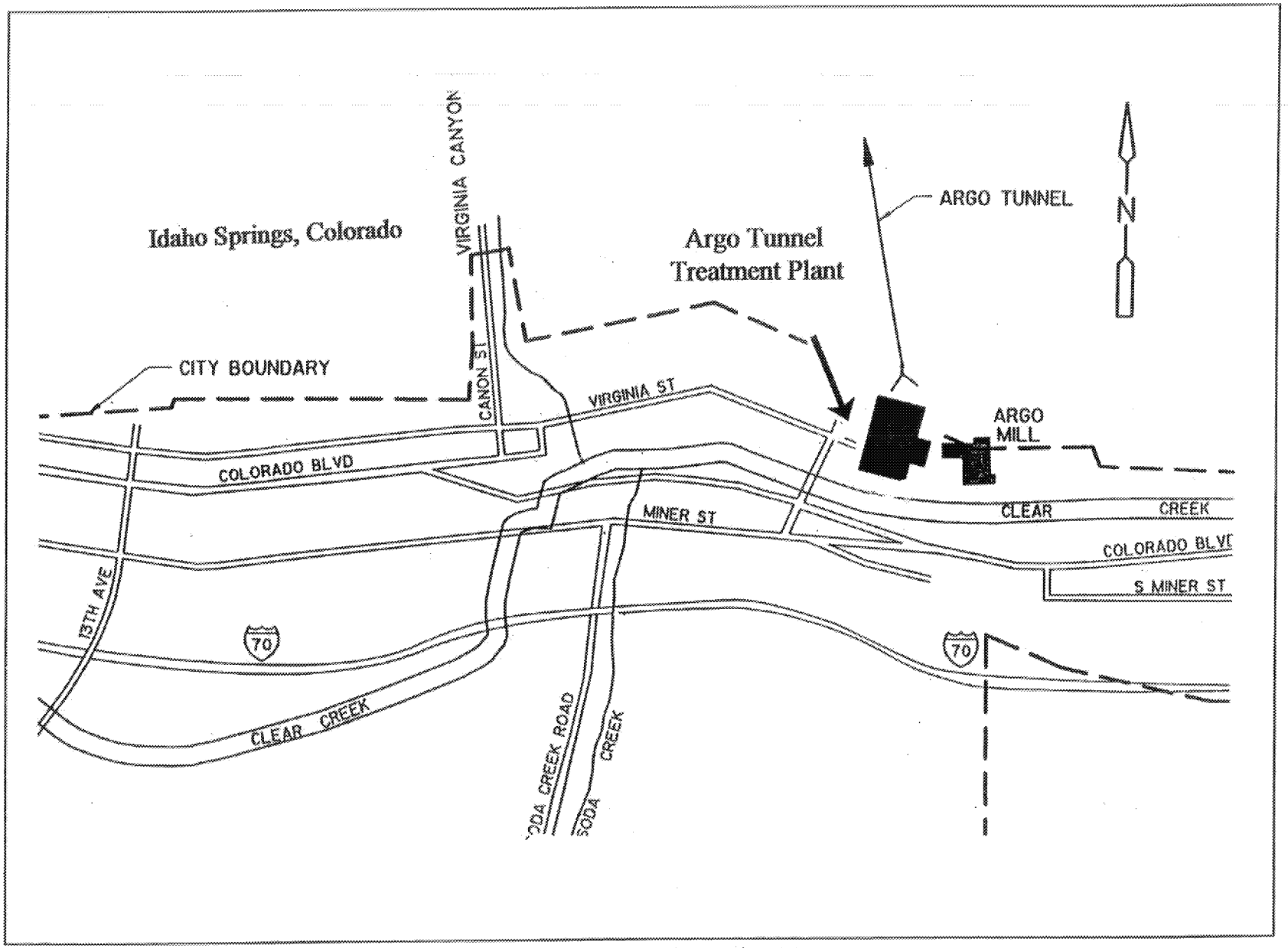


Figure 1. Argo Tunnel Location Map

EPA funded the design of the treatment plant. Plant construction was paid for with 90% EPA Superfund and 10% state funds. This cost sharing arrangement will continue for the first eleven years of plant operation, after which, the operation of the plant will be 100% state funded. EPA acquired the land upon which the treatment plant is constructed through a settlement with the landowner. The settlement is embodied in a Consent Decree dated June, 1997. The State will take title to the land after ten years.

Applicable or Relevant and Appropriate Requirements:

The 1986 Superfund Amendments and Reauthorization Act (SARA) adopted and expanded a provision in the 1985 National Contingency Plan (NCP) that remedial actions must at least attain applicable or relevant and appropriate requirements (ARARs). Applicable requirements mean those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a Superfund site. Relevant and appropriate requirements mean those cleanup standards that address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well suited to the particular site and thus are determined to be both relevant and appropriate for use at the site. To-Be-Considered information (TBCs) are non-promulgated advisories or guidance issued by Federal or state governments that are not legally binding and do not have the status of potential ARARs. There will be circumstances, however, where TBCs, along with ARARs, are used with best professional judgement in determining the necessary level of cleanup.

Both on-site and off-site direct discharges from Superfund sites to surface waters are required to meet the substantive requirements of the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program. These substantive requirements include discharge limitations (both technology and water quality-based), certain monitoring requirements, and best management practices. These requirements would be contained in an NPDES permit for off-site Superfund discharges. For on-site direct discharges from a Superfund site, these substantive requirements must be identified and complied with even though on-site discharges are not required to have an NPDES permit. EPA guidance suggests that a direct discharge of Superfund waste waters would be "on-site" if the receiving water body is in the area of contamination or is in very close proximity to the site and necessary for the implementation of the response action (even if the water body flows off-site.). The State and EPA have determined that, for the purposes of the Argo Tunnel, the discharge is occurring on-site. This means that treatment of the discharge will not require an NPDES permit. However, all substantive requirements of the NPDES program will be met and documented. This document describes the rationale, requirements and procedures which will need to be achieved by the Argo Tunnel on-site remedial action to demonstrate compliance with ARARs, CERCLA, and the NCP.

Argo Tunnel Water Treatment Plant ARARs:

The OU3 ROD established ARARs for the Clear Creek/Central City Superfund Site including the Argo Tunnel water treatment plant. The ARARs that prescribe discharge limits and operational activities are listed below. For most pollutants of concern, there are several overlapping ARARs.

There is also additional information pertinent to the setting of the Argo Tunnel discharge limits which are referred to as To-Be-Considered (TBC), additional information which can be used to set remediation goals.

This compliance document identifies potential ARARs and TBC information for each pollutant of concern and analyses the applicability of the potential ARARs following Sections 121(d)(2)(A)(ii) and B(i) of CERCLA. The most applicable ARARs are then used to calculate each pollutant's discharge limits. See the discharge limit calculation section starting on page 20 for a pollutant by pollutant discussion of limits and ARARs. Also, some of the ARARs have changed since the OU3 ROD was signed in 1991 or new information has become available. This document incorporates any necessary revisions to the ARARs.

The discharge limits and other requirements defined in this document apply or implement ARARs specifically to the Argo Tunnel water treatment plant. It should be noted that the Argo Tunnel is not the only source of pollution in Clear Creek. Water Quality Standards and criteria will not be completely achieved in Clear Creek after start-up of the Argo Tunnel water treatment plant because of other sources of pollution impacting the stream (e.g. other mine discharges, tailings piles, road cuts, and other disturbances of mineralized rock).

Discharge Limits and Requirements ◆ ARARs

Federal

CERCLA - National Contingency Plan

- 40 CFR 300
  - §300.400 (g) Identification of ARARs
  - §300.430 (g)(3) Use of advisories, criteria
  - §300.430 (f)(1) Inconsistent application of requirements, new or changed requirements
  - §300.435 Compliance with ARARs

CWA-NPDES Regulations (surface water discharge permits)

- 40 CFR 122 NPDES permit writing regulations
  - § 122.44 Establishing limitations, pollutants of concern, monitoring
  - § 122.45
- 40 CFR 440 Effluent limitations for active mines and mills
  - §440.104 New source technology based limitations for gold mines.

CWA - Water Quality Standards

- 40 CFR 131
- Water Quality Criteria documents such as the 'Gold Book"

Discharge Limits ◆ ARARs (continued)

Safe Drinking Water Act - Drinking Water Standards

- 40 CFR 141 - MCLs

Colorado

Colorado CDPHE permit writing regulations
5CCR 1002

- 61 Permit writing regulations
- 62 State effluent limits

Colorado - Water Quality Standards
5CCR 1002

- 31 Basic Standards and Methodologies for Surface Water
- 38 Classification and Numeric Standards for the South Platte Basin. Stream classifications and water quality standards for each segment of Clear Creek.

The State of Colorado's Basic Standards and site-specific water quality standards adopted by the State for Clear Creek are the predominate ARARs for the Argo Tunnel treatment plant discharge. The State has established standards for each segment of Clear Creek and its tributaries. The Argo Tunnel water treatment plant discharges into Segment 11 of Clear Creek. The standards for this segment are based on the following water uses: cold water aquatic life (trout fishery), drinking water, agriculture and recreation. In spite of the high quality trout fishery use designation, it is unlikely that water quality in Clear Creek will ever be clean enough to support the most sensitive aquatic species that might live in Clear Creek (usually rainbow trout) because of existing pollution. For that reason Colorado has modified some of the standards or does not normally apply the standards in mining areas. Stream standards may also change in the future with new information or additional remediation.

With the start up of the Argo Tunnel treatment plant, water quality in Clear Creek will improve, increasing protection of trout and other aquatic life. Fish species which are more tolerant of metals, such as brook and brown trout, have been identified by the Federal and State Superfund programs as the biological goal for Clear Creek in the vicinity of the Argo Tunnel. (It should be noted that fish habitat is also a major factor in protecting fish. There are areas of Clear Creek with impaired fish habitat. Generally, habitat restoration cannot be covered under Superfund by EPA.)

As mentioned above some water quality standards adopted by the State for Clear Creek reflect existing pollution. These modified standards (cadmium, copper and zinc) are not completely protective of aquatic life. For these parameters, the discharge limits for the Argo Tunnel water

treatment plant will be based on the most relevant and appropriate requirement; either the underlying (more stringent) aquatic life standard, a standard based on protecting brown trout, or treatment technology.

The water quality standards of 1991 were established as ARARs for the Argo Tunnel water treatment plant. Since that time, new information has become available on the human health effects of manganese. Colorado has also been modifying manganese standards to reflect in-stream manganese concentrations on several Clear Creek and South Platte stream segments and new information has been developed regarding the toxicity of manganese to aquatic life. See the manganese limit derivation discussion for specifics.

In summary, most Argo Tunnel discharge limits are based on the water quality standards and criteria for aquatic life-trout fishery and drinking water-human health. For zinc the limits are based on protecting brown and brook trout.

For each metal, a discussion of potential chemical-specific ARARs and the subsequent effluent limit derivation is contained in the discharge limitation section of this document. Part II of the document, the discharge control mechanism contains the specific effluent limits and monitoring requirements which have been established for the water treatment plant.

Monitoring and Record Keeping Requirements:

The required level of monitoring, record keeping and reporting necessary at Superfund sites is not as well defined as the pollutant specific ARARs. Under Superfund, requirements are separated into "substantive" and "administrative" requirements. Substantive requirements are ARARs that must be attained. Superfund is not required to comply with administrative requirements. Substantive requirements are those that pertain directly to actions or conditions in the environment. Examples include quantitative environmental or health based standards for hazardous substances (e.g., MCLs for drinking water) and technology-based standards (e.g., RCRA minimum technology requirements for double liners and leachate collection systems). Administrative requirements are those mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation, e.g., requirements related to the approval of or consultation with administrative bodies, documentation, permit issuances, reporting, record keeping, and enforcement.

For the Argo Tunnel water treatment plant, EPA and CDPHE have determined that monitoring of parameters with effluent limits are substantive requirements necessary to show that the treatment plant is operating in compliance with ARARs. These parameters and their monitoring frequency are discussed in the last section of this part and specified in the Discharge Control Mechanism. EPA and CDPHE plan on conducting additional monitoring to establish treatment plant efficiency, ensure that influent conditions have not changed significantly, and demonstrate in-stream water quality improvements. This monitoring is a mix of substantive and administrative requirements. Instream monitoring will be substantive if the data is used to evaluate achievement of ARARs in Clear Creek. Monitoring influent conditions will also be substantive when determining the effectiveness of treatment. EPA and CDPHE will also conduct "good neighbor" monitoring of nutrients because Clear Creek watershed members are concerned about nutrient levels in Clear Creek and Standley Lake. This "good neighbor" monitoring is not a substantive requirement.

While record keeping and reporting are typically considered administrative requirements, some level of record keeping and reporting are necessary to demonstrate that the treatment plant is operating in compliance with ARARs. EPA and CDPHE are requiring the contract operator for the Argo Tunnel water treatment plant to maintain records and provide monthly reports to EPA and CDPHE. With this information the two agencies can assess ARARs compliance. The reporting and record keeping requirements are outlined in Section II of the Discharge Control Mechanism.

Contacts - Argo Tunnel Treatment Plant ARARs Compliance Document

Facility:
Argo Tunnel Treatment Plant
2330 Riverside Drive
Idaho Springs, CO 80452
(303) 582-0857 Fax: (303) 567-9274

Facility Operator: Contractor of Colorado Department of Public Health and Environment
CET Environmental Services, Inc.
12570 East 39th Avenue
Denver, CO 80239
(303) 307-3200 Fax: (303) 307-3201

CDPHE Superfund:
Mary Scott/ Ron Abel/ Rick Brown
Hazardous Materials & Waste Management
Division (HMWMD-RP-B2)
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530
(303) 692-3413, 692-3381 or 692-3383

EPA/Superfund:
Dana Allen/Holly Fliniau
Remedial Project Managers
U.S. EPA - Region VIII (EPR-EP)
999 18th Street, Suite 500
Denver, CO 80202-2466
(303) 312-6870 or 312-6535

EPA - Water/NPDES:

Bruce Kent
NPDES Permit Writer
U.S. EPA - Region VIII (8P2-W-P)
999 18th Street, Suite 500
Denver, CO 80202-2466
(303) 312-6133

CDPHE - Water/NPDES:

Phil Hegeman/Don Holmer (WQCD-P-B2)
Permits Unit, Colorado Department
of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530
(303) 692-3598 or 693-3601

Description of Discharge and Monitoring Locations:

Outfall 001 is the outfall from the Argo Tunnel Treatment Plant prior to contact or commingling with any surface or untreated ground water flows. Prior to start up of the treatment plant, Outfall 001 is located immediately below the Argo Tunnel portal. After start up Outfall 001 shall be monitored in the clear well after the treatment units.

Outfall 002 is the by-pass/overflow from the Argo Tunnel Treatment Plant. The Outfall can only be used if flow exceeds 700 gpm, the design capacity of the treatment plant. Small surges (less than 700 gpm) will be treated by starting the second treatment train. The treatment plant also has two holding tanks which can be used for small, short term (less than 1 day) surges. The expected frequency of bypasses is every several years. However, flow surges of greater than 700 gpm have been occurring more frequently in the recent past because of because of several wet years. Old mine working collapses may also cause surges.

Treatment of blow-out or surges was evaluated in the OU3 ROD, dated September 30, 1991. The analyses determined that treatment of surge events was not warranted. Therefore, no discharge limits apply to discharges through Outfall 002. Monitoring will be required at Outfall 002, see the last section of Part I, ACD, for a discussion of monitoring. The monitoring location is the open channel between the plant intake structure and the by-pass pipe.

Figure 2 illustrates the location of Outfalls 001 and 002 in relation to the treatment plant and Clear Creek. Discharges from the Argo Tunnel are not allowed at any locations other than Outfalls 001 and 002.

Water Quality Standards and Criteria

The receiving water for the discharge from the Argo Tunnel Treatment Plant is Clear Creek. The Argo discharge is the boundary between segments 2 and 11 of the Clear Creek Basin. Segment 2 begins at I-70 bridge above Silver Plume and extends to the Argo Tunnel discharge. Segment 11 runs from the Argo Tunnel to the Farmers Highline Canal diversion in Golden. Segment 11 is also designated as use protected.

Numeric Standards: The standards which have been assigned in accordance with the above classifications can be found in 38. Classifications and Numeric Standards for the South Platte River Basin (5 CCR 1002-38), which became effective August 30, 1997. The following numeric standards which have been assigned in accordance with the above classifications are being used to develop effluent limitations.

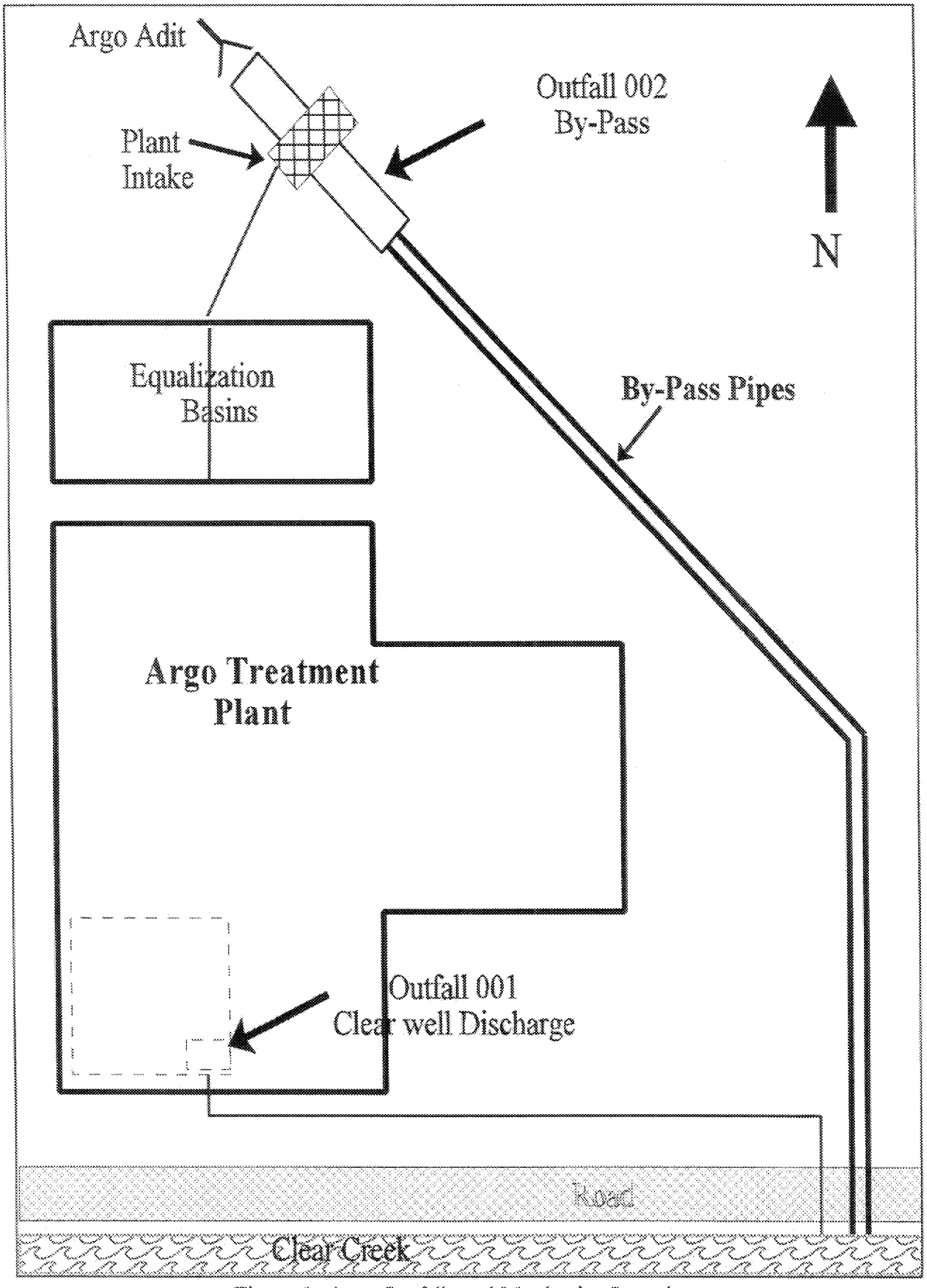


Figure 2: Argo Outfalls and Monitoring Locations

The applicable designated use classifications and standards for Segments 2 and Segment 11 are summarized in Table 1 below:

Detailed water quality standards are listed in Table A-5.

Table 1: Clear Creek Basin Use Classification and Water Quality Standards

Uses:

Segment 2* (Silver Plume to Argo Tunnel)	Segment 11* (Argo Tunnel to Golden)
Aquatic Life, Class 1 (Cold)	Aquatic Life, Class 1 (Cold)
Recreation, Class 1	Recreation, Class 1
Agriculture	Agriculture
	Water Supply
	(Use Protected)

Standards:

Segment 2*	Segment 11*
D.O. = 6.0 mg/L, 7.0 mg/L spawning	Same as 2
pH = 6.5 - 9.0	Same as 2
Fecal Coliform Bacteria = 2000/100ml	200/100 ml
NH_3 (acute) = TVS	Same as 2
NH_3 (chronic) = 0.02 mg/L (unionized)	Same as 2
Cl_2 (acute/chronic) = 0.019/0.011 mg/L	Same as 2
Chloride = no WQS	250 mg/L
Free CN = 0.005 mg/L	Same as 2
S as H_2S = 0.002 (undissolved)	Same as 2
SO_4 - Sulfate = no WQS	250 mg/L
Boron = 0.75 mg/L	Same as 2
Nitrate = no WQS	10 mg/L
Nitrite = 0.05 mg/L	Same as 2
Arsenic (acute) = no WQS (dis.)	50 µg/L(TRec)
Arsenic (chronic) = 100 ug/l (TRec)	no chronic
Cadmium (acute/chronic) = TVS (trout)/TVS	no acute /3 µg/L chronic
Chromium III(acute/chronic) = TVS/TVS	50 µg/L(TRec)/no chronic
Chromium VI(acute/chronic) = TVS/TVS	Same as 2
Copper (acute/chronic) = TVS/TVS	no acute /17 µg/L chronic
Iron (chronic) = 1000 ug/l (TRec)	Same as 2
Iron (chronic) = no WQS (dis)	300 µg/L(dis)
Lead (acute/chronic) = TVS/TVS	Same as 2
Manganese (chronic) = 1000 ug/l (TRec)	Same as 2
Manganese (chronic) = no WQS (dis)	50 µg/L (dis)
Mercury (chronic) = 0.01 µg/L (Total)	Same as 2
Nickel (acute/chronic) = TVS/TVS	Same as 2
Selenium (acute/chronic) = TVS/TVS	no acute ./10 µg/L(TRec)
Silver (acute/chronic) = TVS/TVS(trout)**	Same as 2
Zinc (acute/chronic) = TVS/200 µg/L (TRec)	no acute /300 µg/L

Other applicable Colorado (Basic Standards and Methodologies for Surface Water 31.16, 5 CCR 1002-31), and EPA water quality criteria are summarized below: See Table A-5 for more information about standards or criteria. Water quality criteria or other standards may be applicable or potentially relevant appropriate.

Table 2: Other Colorado and EPA Water Quality Criteria

Aluminum (acute/chronic)	750/87 µg/L (dis)
Antimony (water supply)	6.0 µg/L (TRec) 30-day
Antimony (water + fish)	6.0 µg/L (TRec)
Arsenic (acute/chronic)	360/150 µg/L (dis)
Arsenic (ag)	100 µg/L (TRec) 30-day
Arsenic (water supply)	50 µg/L (TRec) 1-day
Barium (water supply)	1000 µg/L (TRec) 1-day
Beryllium (ag)	100 µg/L (TRec) 30-day
Beryllium (water supply)	4.0 µg/L (TRec) 30-day
Cadmium (ag)	10 µg/L (TRec) 30-day
Cadmium (water supply)	5 µg/L (TRec) 1-day
Chromium III (ag)	100 µg/L (TRec) 30-day
Chromium III (water supply)	50 µg/L (TRec) 1-day
Chromium VI (ag)	100 µg/L (TRec) 30-day
Chromium VI (water supply)	50 µg/L (TRec) 1-day
Chromium VI (acute/chronic)	16/11 µg/L (dis)
Copper (ag)	200 µg/L (TRec)
Copper (water supply)	1000 µg/L (TRec) 30-day
Fluoride (water supply)	2.0 mg/l (TRec) 1-day
Lead (ag)	100 µg/L (TRec) 30-day
Lead (water supply)	50 µg/L (TRec) 1-day
Manganese (water supply)	50 µg/L (dis) 30-day
Mercury (acute/chronic)	2.4/0.1 µg/L (dis)
Mercury (water supply)	2.0 µg/L (TRec) 1-day
Nickel (ag)	200 µg/L (TRec) 30-day
Nickel (water supply)	100 µg/L (TRec) 30-day
Selenium (acute/chronic)	20/5 µg/L (dis)
Selenium (ag)	20 µg/L (TRec) 30-day
Selenium (water supply)	50 µg/L (TRec) 30-day
Silver (water supply)	100 µg/L (TRec) 1-day
Thallium (chronic)	15 µg/L (dis)
Thallium (water supply)	0.5 µg/L (TRec) 30-day
Thallium (water + fish)	0.5 µg/L (TRec)
Uranium (acute/chronic)	TVS/TVS (dis)
Zinc (ag)	2000 µg/L (TRec) 30-day
Zinc (water supply)	5000 µg/L (TRec) 30-day

Footnotes

TVS - Table Value Standard; numerical criteria set forth in Table III from the State of Colorado's Basic Standards and Methodologies for Surface Water, 31.16 (5 CCR 1002-31). TVS are calculated for each metal based on stream hardness. The calculated TVS are shown in Table A-5

ch - chronic
ac - acute
ag - agriculture
TRec - Total Recoverable
dis - dissolved

* From "Classification and Numeric Standards, South Platte River Basin", as amended August 30, 1997.

** Silver (chronic) effective 3/2/98

Identifying Pollutants of Concern, Parameters Potentially Needing Limits and/or Monitoring:

All available data on the Argo Tunnel discharge were reviewed to determine the toxic pollutants present in the effluent at levels of concern or "trigger level". Limits will be developed for pollutants with concentrations which may potentially exceed water quality standards or cause toxic effects (trigger levels). Pollutants with concentrations below trigger levels but with limited or old data will be monitored for the first year to confirm actual pollutant levels. Pollutants at concentrations below toxic levels and with adequate data will not be considered further for limits or monitoring. This review was conducted by comparing the discharge analytical data to the more stringent value from State water quality standards, Federal water quality criteria and proposed or final drinking water standards (MCLs).

The Argo Tunnel discharge and Clear Creek have been sampled on several occasions by the USGS, EPA, the Colorado Department of Public Health and Environment, the Upper Clear Creek Watershed Association and as part of Superfund remedial investigations. Table A-1 in Appendix A presents a compilation of tunnel discharge sampling and analysis results reported in the above studies and reports. Tables A-2 and A-3 present summarized results of monitoring conducted in Clear Creek.

Because analytical data for the Argo Tunnel discharge are limited and the discharge may vary in chemical composition on a seasonal basis, all data was considered in determining if a limit is needed for toxics present in the discharge. This limited data allowed only a semi-quantitative comparison. For example, analytical techniques (total, total recoverable, and dissolved) used for analyzing the Argo Tunnel discharge and Clear Creek samples differ from the published Federal water quality criteria and State water quality standards. For example, the WQS may be in dissolved form and the water quality data may be in total. The two forms are similar but not directly comparable. Also, different levels of detection were used, and some detection limits reported were too high to accurately compare actual discharge pollutant concentrations with State water quality criteria and/or EPA "Gold Book" values. Therefore, a direct quantitative comparison of the Argo Tunnel discharge and Clear Creek analytical results to the criteria and standards was not possible. For example, we may have a parameter with a WQS of 0.1, but the tests only measured to 0.5. For this data, we cannot tell if the WQS is being met. As stated previously, the determination of parameters in need of a limit was made on a conservative basis. Table A-1 is the result of the data review. The second to the last column in Table A-1 indicates whether the parameter will be analyzed further for a limit or if more monitoring is needed to ensure that in-stream water quality standards are not exceeded.

Very little actual data was available to evaluate the pollutant concentrations in the Argo discharge after treatment. Information from bench tests and treatability studies were evaluated when projecting possible effluent concentrations. Historical data on the untreated Argo discharge was used for projecting the need for effluent limits based on water quality standards.

Pollutants of Concern, Parameters Potentially Needing Effluent Limits and/or Monitoring:

After evaluating the data to identify parameters that should be evaluated for effluent limitations and/or monitoring, the pollutants were grouped into four groups: (1) Pollutants expected to be present and have potential to exceed instream water quality standards or other trigger levels [Effluent Limits and Monitoring]; (2) Pollutants at very low concentrations which historically never exceeded water quality standards and are very unlikely to in the future [No Effluent Limits, No Monitoring]; (3) Pollutants which are at generally low levels, have inadequate data, or are expected to be present below levels of concern after treatment [First year Influent and/or Effluent Monitoring, No Effluent Limits]; and lastly, (4) Pollutants which are not expected to be of concern at the Argo Tunnel, but are important for evaluating any changes in the influent to the Argo Tunnel or may be important to other users of Clear Creek water [Monitoring Only]. The following paragraphs describe the conclusions of identifying pollutants of concern at the Argo Tunnel. Instream monitoring will also be required for group 1, 3 and 4 pollutants. See the last section of part 1 regarding monitoring.

Group 1: Pollutants of Concern - Potential Limits and Monitoring
Discharge limitations and monitoring for Group 1 Pollutants will be analyzed further in the next sections of this document, starting on page 20 "Calculation Of Discharge Limits". Group 1 Pollutants are: aluminum, arsenic, beryllium, cadmium, copper, iron, lead, manganese, nickel, silver, zinc, flow, whole effluent toxicity, pH, fluoride, sulfate, total suspended solids (TSS), and oil and grease (O&G). These pollutants are expected to be present and may have potential to exceed instream water quality standards or trigger levels. Some of these pollutants upon further analysis will not need limits such as aluminum, beryllium, fluoride, and sulfate.

Group 2: Pollutants - No Limits, No Monitoring
Antimony, barium and molybdenum were the only monitored parameters which never exceeded a "Gold Book" value or a State water quality criterion. For example, both total and dissolved antimony maximum concentrations are less than 10 percent of "Gold Book" criteria for chronic aquatic life. Barium, has never been detected in the Argo discharge. Also, there are no published "Gold Book" criteria or State water quality criterion for cobalt, strontium, tin, and vanadium, and hence, no basis for establishing a water quality effluent limit or monitoring. Therefore, no limits or monitoring will be required for antimony, barium, cobalt, molybdenum, strontium, tin, and vanadium.

Total Dissolved Solids (TDS) were found in relatively high concentrations in the Argo Tunnel discharge. A limit and monitoring was not evaluated further for dissolved solids because the ions of concern that make up TDS will have individual effluent limitations. TDS monitoring will be included because the test is inexpensive and a simple indicator of ionic concentrations.

The untreated and treated discharge from the Argo tunnel is primarily comprised of metal cations and anions, and therefore is expected to contain little or no organic matter and should exhibit little or no oxygen demand on the receiving water. Thus, there will be no limits or monitoring requirements for biochemical oxygen demand (BOD), chemical oxygen demand (COD), or total organic carbon (TOC); or for dissolved oxygen (D.O.). In addition, no sanitary wastewater enters in the discharge, therefore no fecal coliform limits or monitoring will be required.

Group 3: Pollutants of Concern - First Year Monitoring Only

Several metals specifically, mercury, selenium, and thallium, were found in the untreated Argo Tunnel discharge at or around the analytical detection limit. In evaluating the downstream water quality in Clear Creek, it appears that none of these metals are in significant concentrations to have the potential to exceed instream water quality standards. However, because of elevated analytical detection limits and the lack of recent data for selenium, thallium, and mercury, limits will not be required for these pollutants. Influent and/or effluent monitoring will be required during the first year to determine if mercury, selenium, and thallium are present at levels of concern. The treatment plant is expected to further reduce the concentration of these metals in the discharge.

Another set of pollutants that will have no initial limits but will be monitored are ammonia-N, radium, uranium and gross alpha. There has been little or no information collected on the concentrations of these pollutants in the Argo discharge, and therefore, the pollutants will be monitored in the treatment system influent and effluent to determine if these constituents are of concern.

An additional set of pollutants which shall not have limits but will require monitoring is chromium, and hexavalent chromium. These pollutants have been monitored in the Argo discharge and have been detected at levels generally below applicable water quality criteria; however, several samples approached or exceeded criteria. Since the treatment system may remove these pollutants, monitoring will only be required for the first year to determine if the level of these pollutants in the treated discharge are at levels of concern.

Group 4: Pollutants of Concern - Watershed or Indicator Parameters. Monitoring Only

Total phosphorous will be monitored during the first year to provide data to the Upper Clear Creek Watershed Association and Standley Lake Users regarding the quantity of phosphorous being discharged into Clear Creek and Standley Lake.

Nitrate/nitrite levels will be monitored to establish current levels of these compounds in the Argo influent and discharge. Cyanide will also be monitored on the influent to determine the presence of cyanide in the discharge before treatment. Influent cyanide and nitrate/nitrite may be monitored throughout the life of the control mechanism because they are prime indicators of active mining influencing historic water quality. The Argo Tunnel has at least one cyanide heap leach facility above it. This facility has considered discharging surplus wastewater into old mine workings. Other cyanide based gold mining/beneficiation activities in areas that may drain into the Argo Tunnel may be also developed in the future. Increased concentrations of nitrate and/or nitrite may also indicate wastewater discharges from active mining in the area. Nitrate is a by-product of active blasting. A baseline for cyanide, nitrate, and nitrite must be established so that any changes in the discharge quality due to new mining can be documented. Nitrogen forms are also of concern to the Standley Lake users. Monitoring will be conducted for these parameters on the influent, effluent and/or instream.

For cyanide, the standard for the receiving stream is based upon "free" cyanide concentrations. However, there is no analytical procedure for measuring the concentration of free cyanide in a complex effluent. Therefore, ASTM (American Society for Testing and Materials) analytical procedure D2036-81, Method C, will be used to measure weak acid dissociable cyanide in the effluent. This analytical procedure will detect free cyanide plus those forms of complex cyanide that are most readily converted to free cyanide.

Hardness of the discharge will also be monitored, but will not have a limit. Flow limits will be discussed later. If mass loading limits for specific pollutants are later developed, they will be established using current and historical flow and pollutant concentration data. Flow and hardness are also necessary to be monitored to fully understand the effect of pollutant loadings in Clear Creek and to ensure that excursions of instream water quality standards are not allowed by the control mechanism. Instream monitoring of flow and hardness in Clear Creek will also be monitored to collect information to evaluate the effectiveness of the remedial action, reevaluate limits and reopen the control mechanism as necessary.

Although none of the Group 4 pollutants are expected to be present at significant levels, the control mechanism can be reopened and limits and continuous monitoring added if they are found at levels of concern.

Determining Effluent Limitations

There are three main types of effluent or discharge limitations. Limits are usually based on: (1) water quality standards and criteria, (2) treatment technology performance, or (3) state effluent standards. During the time when this discharge control mechanisms was being developed, the treatment system was not in operation. Therefore, no treated effluent was available for analysis. Without any chemical analyses of the effluent, it is not possible to precisely determine which pollutants will need technology based effluent limits. Consequently, for this initial control mechanism, limits are almost exclusively based on water quality standards and criteria.

Interim Effluent Limitations

There are two sets of interim limits. Initially, during construction and the first months of start-up, the existing water quality from the Argo Tunnel shall be maintained to the maximum extent possible. Expected practices include minimizing the resuspension of sediment and metal precipitants. The second set of interim limits starts 90 days after the treatment plant begins operating. These interim effluent limitations are shown in Table A-8 and are based upon Best Professional Judgment using New Source Performance Standards (NSPS) for Ore Mining and Dressing Point Source Category; Lead, Copper, Zinc Gold, Silver and Molybdenum Ores (40 CFR Part 440 Subpart J; 440.104). Although the NSPS are not directly applicable to historic mine drainage, the NSPS represent levels achievable by simple metals precipitation. The NSPS limit for mercury has not been included because mercury was rarely detected in the untreated Argo drainage. An additional limit for oil and grease, based on State of Colorado Effluent Standards, is included in the interim standards. The pH limit is based on Colorado Water Quality Standards. The interim limits are presented in tabular form as Table A-4.

Final Effluent Limitations

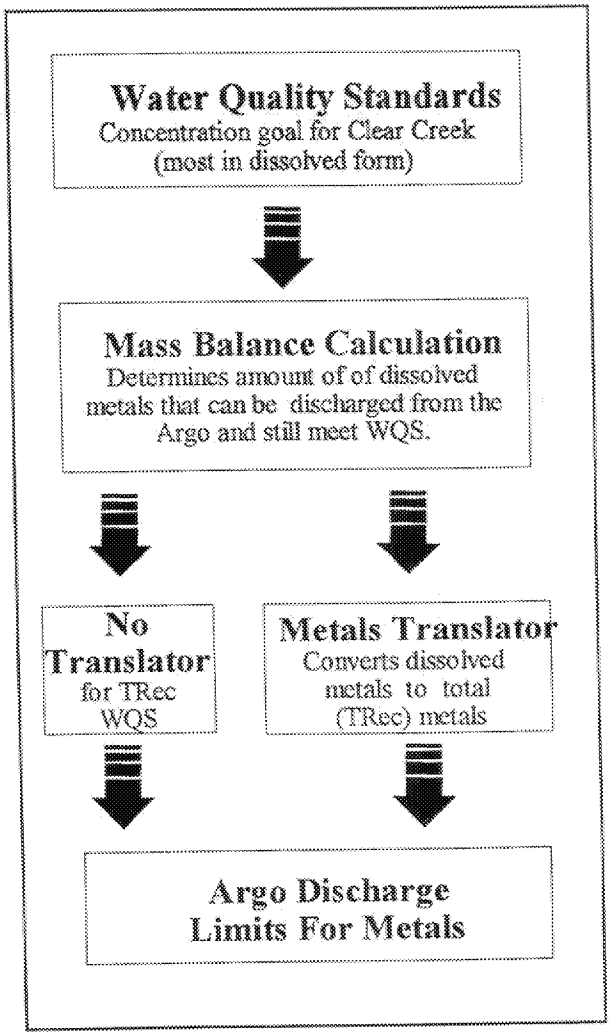
Final effluent limitations and monitoring frequencies are presented in Table A-10. They become effective November 1, 1998. This date is based on nine months start-up for the treatment plant. Final effluent limitations and monitoring requirements are derived from the State of Colorado's Water Quality Standards, National Ambient Water Quality Criteria ("Gold Book" values), the State of Colorado's Effluent Standards and Best Professional Judgement. In addition, selected parameters were evaluated using EPA's Metals Translator, which converts effluent limits based on dissolved water quality standards to Total Recoverable effluent limits. The effluent limitations for this control mechanism have been developed to control all pollutant parameters which are or may be discharged from the Argo Tunnel at a level which will cause, have the reasonable potential to cause or contribute to, an excursion above a State water quality standard including the State narrative criteria for water quality or National Ambient Water Quality Criteria.

CALCULATION OF DISCHARGE LIMITS

Group 1 - Pollutants with Final Limits and Monitoring:

Discharge limitations and monitoring have been developed for the following metals: arsenic, cadmium, copper, iron, lead, manganese, nickel, silver and zinc. In addition, limits and monitoring have been developed for whole effluent toxicity, pH, total suspended solids (TSS), and oil and grease (O&G).

Water quality standard (WQS) based limitations were generally developed following the diagram to the right. Depending on the mass balance calculation, WQS limits either include no allowance for dilution due to high pollutant background concentrations in Clear Creek upstream of the discharge, or the limits were based on a simple mass balance allowing for dilution to ensure instream water quality standards are met (waste load allocation). For pollutants which already exceed the WQS upstream of the Argo, there are no mass balance or dilution allowances. The treatment plant limit is based on meeting the WQS at the end of the pipe. As the waste load allocations and standards are refined for Clear Creek, the control mechanism may be reopened to incorporate revised concentration or mass based water quality based limits.



Mass Balance Calculation:

The mass balance calculations are based on the low flow rates for Clear Creek, the Argo discharge flow rate (design capacity), the concentration of pollutants in Clear Creek upstream of the Argo Treatment Plant and water quality standards. The simple mass balance equation is below.

Flow values corresponding to 1E3[1] and 30E3[1] conditions of Clear Creek near the treatment plant (from rationale [September 1996] for Idaho Springs permit) are summarized on the next page:

---

[1]Acute low flow: 1E3 = lowest flow for one day occurring on average every three years
Chronic low flow: 30E3 = lowest flow for 30 consecutive days (monthly), occurring on average every three years.

Acute and Chronic Low Flows, Clear Creek, Idaho Springs

	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acute	29	29	29	36	39	64	124	124	77	59	46	33	33
Chronic	34	39	39	39	39	59	172	102	70	62	46	41	34

Many of the metals water quality standards are based on hardness. A low flow hardness of 50 mg/L was used in the calculation of effluent limitations (for Cd, Cu, Ni, Pb, Ag and Zn) based on aquatic life criteria which vary with hardness. This value is a close estimate of hardness of Clear Creek at high flow conditions. There is no actual data available to determine the hardness range in Clear Creek once the Argo Treatment plant is operating. The limits for these parameters should be revised or reevaluated when actual instream hardness data is developed after the treatment system is fully operational. The future treatment plant may also add some hardness to the receiving water.

A mass balance equation was used to determine the effluent concentrations that would not violate the allowable in-stream concentrations defined by the WQ standards (except in the case of pH, where the limits are set directly from stream standards or effluent regulations without using a mass balance approach). The mass balance equation is:

$$M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

Where:

Q_1	=	Upstream low flow (1E3 or 30E3)
Q_2	=	Average daily effluent flow (design capacity)
Q_3	=	Combined downstream flow ($Q_1 + Q_2$)
M_1	=	Upstream background pollutant concentration
M_2	=	Unknown; Maximum allowable effluent pollutant concentration calculated using mass balance equation
M_3	=	Maximum downstream allowable pollutant concentration (stream standard)

The following flows were used in the mass balance equation:

Flow	Acute (1E3)	Chronic (30E3)
Q_1	29 cfs	34 cfs
Q_2	1.56 cfs	1.56 cfs
Q_3	30.56 cfs	35.56 cfs

Because of the mathematical relationship between flow, pollutant concentration and pollutant mass, concentration limitations for the Argo Treatment Plant calculated using this method implicitly limit instream pollutant mass to a maximum allowable level. Calculations assumed a design flow of the Argo treatment system of 700 gpm. The plant will normally operate around 200 gpm. Upstream data collected at monitoring location SW-07 (Clear Creek below Chicago Creek) was used for background pollutant concentrations upstream. Stream standards for Segment 11 were applied as downstream maximums. A summary of potentially applicable stream standards is presented as Table A-5. A summary of the mass balance calculations are shown in Table A-6.

For several metals (cadmium, copper, manganese and zinc) mass balance calculations were not possible because upstream water quality already exceeds water quality standards. As pointed out previously, the Argo Tunnel is one of many sources of pollution in Clear Creek. Even if the Argo Treatment Plant could remove 100% of the metals in the tunnel discharge, water quality standards would still not be achieved because of other pollution sources. The Argo Treatment Plant will be removing 98% to 99.7% of the pollutants of concern.

Metals Translator:

Most of the metal water quality standards are in dissolved form. The analytical methods that will be used to monitor effluent quality are for total recoverable metals. The metals translator converts the dissolved limit to a total recoverable (TRec) limit. The EPA's Metals Translator converts dissolved effluent limits into a total recoverable effluent limits through use of downstream ratios of dissolved and total recoverable metals. For this evaluation, instream data collected from 1994 - 1997 at sample location CC-40 (Clear Creek below Idaho Springs WWTP) will be used. It is assumed that the ratios of dissolved and total metals in the Argo discharge and the stream will be approaching or at equilibrium at this location, and influence by other point and nonpoint sources is minimal. The metals translator analysis is presented as Table A-7. The metals translator is not applied to WQS already in TRec form. The metals translator is also not applied to pollutants where there was not enough data to calculate a metals translator. In those cases, the dissolved limit will be monitored by total recoverable methods.

A comparison of potential limits based on water quality standards in the dissolved and total recoverable form (TRec)[Table A-5] and calculated metals translator values is shown in Table A-8. The lowest value from either the translator and/or the mass balance equation will be used as the basis for the effluent limit.

Discharge Limits For Specific Parameters:

ALUMINUM

The Argo Tunnel effluent data showed that aluminum concentrations average around 30,000 µg/L (See Appendix Table A-1). All samples analyzed for total or dissolved aluminum had concentrations exceeding "Gold Book" values and State criteria. The ARARs that were considered in setting limits are: 750 µg/L acute and 87 µg/L chronic Colorado basic water quality standards. However, these aluminum standards have not been specifically applied to this segment of Clear Creek and are therefore not a legally applicable ARAR. For many stream segments with historic mining pollution, the State has not applied the 750 and 87 µg/L standards; therefore it is not appropriate to apply the basic aluminum standards on this segment of Clear Creek. When specific standards have not been established, an indicator limit can be developed such as WET.

Whole effluent toxicity have been used previously to control toxicity from aluminum in a similar mining discharge on Clear Creek. Therefore, no aluminum discharge limits have been included in the control mechanism. Instead, the toxic effects of aluminum will be controlled through a whole effluent toxicity (WET) limit of "no acute toxicity". Later a technology based, or a site specific limit, may be developed for aluminum. A technology based limit could not be developed at this time because there is no performance data yet and the amphoteric nature of aluminum chemistry. (Aluminum dissolves at both high and low pHs.). The chemistry and toxicity of aluminum are further complicated because of the propensity of aluminum to combine with other ions and organics to form complexes and polymers. Depending on the form of aluminum, toxicity ranges from relatively high to minor toxicity. Because of the variability in aluminum toxicity, WET testing is a good measure of aluminum toxicity. Monitoring for aluminum will be required.

ALUMINUM SOURCE OF CRITERIA[2]	CHRONIC CRITERIA	ARAR[1] STATUS	ACUTE CRITERIA	ARAR[1] STATUS
Basic TVS	87 µg/L	Rel.	750 µg/L	Rel.
Old State Basic Standard, in ROD	150	Rel.	950	Rel.
Current WQS applied by CO WQCC to Segment 11	No criteria	L.Appl.	No criteria	L.Appl.
NPDES Regs. 122.44(d)(vi)	Use Surrogate	R&A	Use Surrogate	R&A
WQS - No Toxins in Toxic Amounts	No Toxicity	L.Appl.	No Toxicity	L.Appl.

FINAL DISCHARGE LIMITS AND MONITORING FOR ALUMINUM	
Chronic - No chronic limit	**Acute Limit:** No acute toxicity
Monitoring - Acute Whole Effluent Toxicity tests (WET), quarterly.	

Footnotes - see page 24.

[1] ARAR STATUS- This column denotes the potential ARAR status of each criteria.
L.Appl. = legally applicable;
Rel. = relevant (but not appropriate);
R&A = both relevant and appropriate;
TBC = to be considered information.

[2] Source of Criteria or Standard:
WQS - Water Quality Standard in Segment 11 of Clear Creek.
NPDES Regs - Federal Regulations for Surface Water Permits, 40 CFR 122.
TVS - Table value standard, part of Colorado WQS.
Basic TVS - General CO TVS; however not applied to segment 11.
CO WQCC - Colorado Water Quality Control Commission. Appointed commission which decides Colorado's WQS, and the regulations used to apply standards.
MCL - Maximum contaminant level, drinking water standards.
BPJ - Best Professional Judgement per NPDES Regs.
CO - DOW - Colorado Division of Wildlife.

[3] The acute cadmium TVS limit was not included because there is no legally applicable WQS, and the mass balance was greatly affected by the limited data set.

[4] Acclimated Trout

[5] Lehnertz, Christine; Colorado Division of Wildlife; *Clear Creek Basins--The Effects of Mining on Water Quality and the Aquatic Ecosystem;* March 1991.

ARSENIC

A maximum limit of 400 µg/L for total arsenic is included in the control mechanism based on the State of Colorado MCL- water quality standard of 50 µg/L arsenic. Total arsenic measured in the Argo Tunnel discharge range from 35 - 238 µg/L. This limit is more stringent than other limits derived for aquatic life (acute and chronic). Therefore, only an acute , MCL based limit will be applied.

ARSENIC SOURCE OF CRITERIA	CHRONIC CRITERIA	ARAR STATUS	ACUTE CRITERIA	ARAR STATUS
WQS - Drinking Water MCL	---	L.Appl.	50 µg/L Total	L.Appl.
WQS - Aquatic Life TVS	150 Dis	L.Appl.	360 Dis	L.Appl.

FINAL DISCHARGE LIMITS AND MONITORING FOR ARSENIC	
Chronic - No limit	**Acute - maximum limit** based on: 50 µg/L WQS and mass balance calculation = 400 µg/L
Monitoring - Weekly, Total As	

CADMIUM

Both total and dissolved cadmium concentrations in the Argo Tunnel effluent exceeded State water quality standards (WQS) and "Gold Book" criteria. The average dissolved cadmium concentration calculated from discharge data ranges from 122 - 540 µg/L, which is well in excess of "Gold Book" criteria. Instream concentrations also appear to exceed the State WQS and criteria; however, the detection limits were above the WQS. The analytical detection limit for cadmium for the existing data range from 14 to 25 µg/L, the water quality criteria range from 0.66 to 3 µg/L, less than the detection limits. From other data downstream with better detection limits, cadmium ranges from 0.5 to 5.8 µg/L, exceeding on average the cadmium water quality criteria.

A "site specific" water quality standard of 3 µg/l (chronic) has been established by the Colorado WQCC for cadmium. The site specific WQS takes into account some of the existing pollution in Clear Creek. The 3 µg/l is a prediction of ambient water quality after some clean-up of cadmium sources. Site specific standards are established for stream segments such as Clear Creek where there is historic pollution and it is unlikely that water quality can ever be cleaned up to meet the basic TVS (0.66 chronic and 1.8 µg/l acute). As clean up progresses, a revised site specific water quality standard may be established, based on water quality or protecting a specific biological community (i.e. brown trout and its food sources). The discharge limits may be revised if a new standard is established. Other difficulties in establishing cadmium discharge limits are a lack of data immediately upstream of the Argo Tunnel and the low analytical detection limit needed for cadmium. Most of the upstream data is from just below Chicago Creek which does not include pollution from Virginia Canyon. The poor detection limit for cadmium makes the data unreliable, possibly creating false highs.

To resolve these informational impediments, we have developed a chronic discharge limit of 3 µg/l based on applying the existing water quality standard without using the mass balance calculations. This limit is substantially more restrictive than applying the legally applicable WQS, which calculates to a 36 µg/l cadmium limit. The limit of 3 µg/L is also protective of brown and brook trout. There is also an acute cadmium water quality standard of 5µg/L based on drinking water supply. The standard was applied directly without mass balance calculations to be more protective because of concerns about background data for cadmium. Monitoring of TRec cadmium will be required on a weekly basis. Upstream and downstream monitoring of Clear Creek will also be required at appropriate detection limits.

CADMIUM (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	CHRONIC DISCHARGE LIMIT	ARAR STATUS	ACUTE CRITERIA	ACUTE DISCHARGE LIMIT	ARAR STATUS
TVS - trout, hardness based (Seg. 2)	0.66 Dis	5.3 TRec	Rel.	1.8 Dis	2.3[3] TRec	Rel.
WQS - site specific (Seg. 11) from ROD	3 TRec	36 TRec	L.Appl.	---		
WQS - site specific, no mass balance calculation, BPJ	3 TRec	3 TRec	TBC	---		
WQS - site specific (Seg. 11) current	3 Dis	74.3 TRec	L.Appl.	---		
MCL - drinking water	---			5.0 TRec	23.6 TRec	L.Appl.
MCL - drinking water	---			5.0 TRec	5.0 TRec	TBC
CO - DOW Trout Criteria:[5] Rainbow Brown Brook	0.7-1.5 DIS 2.0[4] 1.7-3.4	5.1-23 34.7 27.9-66.6	TBC	3 DIS 1.4 3.6-60		TBC

FINAL DISCHARGE LIMITS AND MONITORING FOR CADMIUM	
Chronic - monthly average limit based on: 3 µg/L WQS directly applied to discharge without mass balance calculations = 3 µg/L.	**Acute - maximum limit** limit based on: 5 µg/L WQS directly applied to discharge without mass balance calculations = 5 µg/L.
Monitoring - Weekly, TRec	

Footnotes - see page 24.

COPPER

Both total and dissolved copper concentrations in the Argo Tunnel effluent exceeded state water standards and "Gold Book" criteria. The average dissolved copper concentrations from the Argo Tunnel sampling results ranged from 4300 to 6720 µg/L. The average total copper concentrations ranged from 4100 to 13000 µg/L. As discussed above in the cadmium section, a site specific water quality standard for copper has been established for segment 11 of Clear Creek of 17 µg/l, chronic. We have applied the site specific chronic copper standard directly to the Argo discharge, as with cadmium, because of concerns about upstream data quality and to provide increased protection of aquatic life. The acute limit of 35 µg/L Cu is based on the TVS. Weekly monitoring of TRec copper will be required.

COPPER (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	CHRONIC DISCHARGE LIMIT	ARAR STATUS	ACUTE CRITERIA	ACUTE DISCHARGE LIMIT	ARAR STATUS
TVS - hardness based	6.5 Dis	25 TRec	Rel.	9.2 Dis	35 TRec	R&A
WQS - site specific (Seg. 11) from ROD	17 TRec	39 TRec	L.Appl.	---		
WQS - site specific (Seg. 11) current	17 Dis	64.4 TRec	L.Appl.	---		
Human health advisory	1,300 TRec	Aquatic life more restrictive	TBC	---		
WQS - site specific, no mass balance calculation, BPJ	17 TRec	17 TRec	TBC	---		
CO - DOW Trout Criteria:[5] Rainbow Brown Brook	11.4-31.7 Dis 22-43 4.5-17.4		TBC	5.2-56 Dis unknown 99-110		TBC

FINAL DISCHARGE LIMITS AND MONITORING FOR COPPER	
Chronic - monthly average limit based on: Site Specific WQS applied without mass balance calculation = 17 µg/l TRec	**Acute - maximum limit** based on: TVS, mass balance calculation, metals translator = 35 µg/l TRec
Monitoring - Weekly, TRec	

IRON

Iron is present in the Argo Tunnel effluent in concentrations substantially above the State standards and "Gold Book" criteria. Therefore, limits and monitoring for iron is included in this control mechanism. The average dissolved iron concentrations from the Argo Tunnel discharge data ranged from 97 to 204 mg/L (97,000-204,000 µg/L) and the average total iron concentration ranged from 100 to 328 mg/L. The monthly average limit for total recoverable iron is 15,800 µg/L, based on the aquatic life TVS (1,000 TRec) standard for Segment 11 and allowance for dilution. The limit based on the secondary MCL of 300 µg/L dissolved, was not included because it is less restrictive than the TVS based limit when converted to a total recoverable (245,000 µg/L TRec limit). At a later date, a technology based limit may be developed for iron.

IRON (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	CHRONIC DISCHARGE LIMIT	ARAR STATUS	ACUTE CRITERIA	ACUTE DISCHARGE LIMIT	ARAR STATUS
WQS - TVS	1,000 TRec	15,800 TRec	L.Appl.	---		
WQS-Secondary MCL [6]	300 Dis	245,000 TRec	L.Appl.	---		
BPJ		Evaluate BPJ in Future		---		

FINAL DISCHARGE LIMITS AND MONITORING FOR IRON	
Chronic - monthly average limit based on: mass balance and 1,000 TVS = 15,800 µg/L	**Acute** - no limit
Monitoring - weekly, TRec Fe	

LEAD

Elevated levels of total and dissolved lead are present in the Argo Tunnel effluent. Results of the effluent sampling (see Table A-1) show that these concentrations have exceeded State WQS and "Gold Book" aquatic life criteria for lead. Therefore monthly average and maximum limits have been included in this control mechanism. The monthly average is 4.75 µg/L total recoverable lead. A maximum limit of 905 µg/L total recoverable lead is also included based on acute TVS. Since the ROD was signed, the lead MCL of 50 µg/L has been replaced with an "action level" of 15 µg/L lead. If drinking water supplies exceed the 15 µg/L, then the supplier is required to control lead by reducing line corrosion, treating source water and/or replacing lead service lines. The acute limit is based on this advisory.

LEAD (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	CHRONIC DISCHARGE LIMIT	ARAR STATUS	ACUTE CRITERIA	ACUTE DISCHARGE LIMIT	ARAR STATUS
WQS-TVS hardness based	1.5 Dis	4.75 TRec	L.Appl	31.3 Dis		L.Appl.
Action Level Drinking Water			TBC	15 TRec	219 TRec	TBC
Old MCL in ROD				50 TRec	905 TRec	L.Appl.

FINAL DISCHARGE LIMITS AND MONITORING FOR LEAD	
Chronic - monthly average limit based on: TVS, mass balance & metals translator = 4.75 µg/L	**Acute - maximum limit** based on: new advisory & mass balance = 219 µg/L
Monitoring - weekly, TRec Pb	

[6] Secondary MCLS - Standards for drinking water aesthetics. Iron and manganese can discolor water, stain laundry or plumbing fixtures, or affect the taste of water.

MANGANESE

High concentrations of both total and dissolved manganese are present in the Argo Tunnel effluent. The average dissolved concentrations are calculated from the Argo Tunnel effluent data ranged from 73 to 149 mg/L. The average total concentrations ranged from 74 to 140 mg/L. From this data it is apparent that a manganese limit is needed. However, as listed below, there is a wide range of potential manganese ARARs and other information to consider in setting limits.

MANGANESE (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	ARAR STATUS	ACUTE CRIT.	ARAR STATUS
WQS -Seg.11 Secondary MCL [6]	50 Dis	L.Appl.	--	
Secondary MCL [6]	50 Dis	Rel.	--	
Site Specific WQS, Seg. 14, Golden [7]	500 Dis	Rel.	--	
Technology Based Limit	No data yet	L.Appl.		
Human Health Protection Recommendation	800 TRec	TBC	--	
Aquatic Life TVS	1000 TRec	L.Appl.	--	
Temporary Modification of Segment 14 [7] standard, in effect until 6-30-2000	1200 Dis	Rel.	--	
Hardness Based, Site Specific Standard for Segment 5, West Fork of Clear Creek	5000 Dis	Rel.	--	
TMDL [8] for Manganese	to be determined	L.Appl.	--	

From our analysis, we identified the 800 µg/L recommendation as the most appropriate criteria to use in setting limits at this time. The 800 µg/L concentration is the chronic manganese level recommended by EPA's drinking water toxicologist to protect human health. The recommendation converts directly into the discharge limit as there is no dilution and the recommendation is in TRec form. The manganese discharge limit is likely to change in the next several years for any one of the following reasons: a Total Maximum Daily Load is calculated for Clear Creek, sufficient data is available for a technology based limit, the 50 µg/L WQS is changed to an ambient standard or other new information becomes available.

[7] Clear Creek Segment 14 is from the Farmers Highline Canal diversion and Youngfield.

[8] TMDL-Total Maximum Daily Load is the mass (lbs/day) of manganese that should enter Clear Creek. Major sources of manganese will be allocated a portion of the TMDL, called a waste load allocation (WLA).

FINAL DISCHARGE LIMITS AND MONITORING FOR MANGANESE	
Chronic - monthly average limit based on: human health protection recommendation = 800 µg/L.	**Acute** - no limit
Monitoring - weekly, Mn TRec	

The most restrictive limit based on the 50 µg/L standard was not included for several reasons: (1) The 50 standard is not typically applied to stream segments in areas with high background manganese concentrations. For example, on Clear Creek the dissolved manganese WQS on segment 14 has just been changed from 50 to 1200 µg/L until the year 2000 and 500 µg/L thereafter. The 1,000 µg/L TRec manganese standard was also dropped from Segment 14. The 50 µg/L standard on the South Platte between Littleton and Denver and then below Denver have been changed to 190 and 400 µg/L, respectively. (2) The 50 µg/L standard is not based on protecting human health or the environment. The number is based on drinking water system aesthetics. At concentrations above 50 µg/L, manganese may cause a brown/yellow water color or stain laundry or plumbing fixtures. (3) The secondary MCL of 50 µg/L dissolved manganese will be achieved in drinking water supplies. Most municipalities treat drinking water to remove manganese. (4) The treatment process will not be as efficient for zinc and aluminum removal if the treatment plant is operated to reduce manganese to 50 µg/L. The plant will operate better at moderate manganese discharge limits. It should be noted that at the 800 µg/L limit, the plant will be removing over 99% of the manganese from the Argo Tunnel discharge. Untreated, the Argo discharges an average of 102,000 µg/L manganese.

The 50 µg/L standard is a legally applicable ARAR. However, EPA and CDPHE have decided to waive the ARAR using the waiver provisions of CERCLA at Section 121(d)(2)(4).

NICKEL

Dissolved nickel has been detected in the Argo Tunnel discharge between 187 and 628 µg/L. These concentrations exceed the State water quality criteria for dissolved nickel. A monthly average limit of 850 µg/L is included based on the TVS and allowance for dilution. The dissolved limit will be directly applied as a TRec limit because detection limits in the data did not allow a metals translator to be calculated. Since the calculated acute limit (10,305 µg/L) is much greater than the levels that will occur in the discharge, only the chronic limit will apply.

NICKEL SOURCE OF CRITERIA	CHRONIC CRITERIA	ARAR STATUS	ACUTE CRITERIA	ARAR STATUS
WQS-TVS hardness based	56.4 µg/L	L.Appl.	545 µg/L	L.Appl.
FINAL DISCHARGE LIMITS AND MONITORING FOR NICKEL				
Chronic - monthly average limit based on: TVS, mass balance = 850 µg/L		**Acute** - no limit. Potential limit greater than untreated discharge.		
Monitoring - weekly, TRec Ni				

SILVER

Total silver has been detected in the Argo Tunnel effluent as high as 145 µg/L. Dissolved silver has been detected as high as 8.4 µg/L. Dissolved silver concentrations exceeded the State of Colorado's water quality standards. It is unknown if there is potential dilution for a waste load allocation (WLA), as the detection limits in the upstream water quality data were quite high. High detection limits also made it infeasible to calculate metals translator for silver. Therefore, the dissolved silver limits of 0.02 µg/L chronic and 0.62 µg/L acute are directly based on the State chronic and acute TVS. When additional dissolved and total recoverable silver data becomes available, this limit may be increased to reflect the metal translator from dissolved WQS to TRec limits.

SILVER SOURCE OF CRITERIA	CHRONIC CRITERIA	ARAR STATUS	ACUTE CRITERIA	ARAR STATUS
WQS - TVS hardness based	0.02 µg/L	L.Appl.	0.64 µg/L	L.Appl.
FINAL DISCHARGE LIMITS AND MONITORING FOR SILVER				
Chronic - monthly average limit based on: TVS = 0.02 µg/L		**Acute - maximum limit** based on: TVS = 0.64 µg/L		
Monitoring - weekly, TRec Ag				

ZINC

The average dissolved zinc concentration for the Argo Tunnel discharge sample results ranged from 40,000 - 116,000 µg/L. The average total zinc concentrations ranged from 40,000 - 108,000 µg/L. Zinc is probably the most significant pollutant of concern for aquatic life at the Argo Tunnel. The State WQS for zinc in this segment is 300 µg/L per liter TRec (chronic). This site specific standard is based on existing water quality minus the zinc contributions from sources which the State expected to be controlled within the next several years, such as the Argo Tunnel. Once the Argo Tunnel Treatment Plant goes on line and the Argo discharge is no longer entering Clear Creek without treatment, it is likely that the State will reevaluate the 300 µg/L standard. Because of the likelihood that the WQSs will change on Clear Creek, the control mechanism discharge limit is based on protecting brown and brook trout. The final total recoverable chronic zinc discharge limit is 225 µg/L, which works out to a dissolved water quality goal of 155 µg/L Zn. At a later date, we anticipate the 225 µg/L Zn limit will be revised to reflect actual Argo Treatment Plant performance or a new site specific WQS for Zn. It should be noted that the dissolved zinc concentration in Clear Creek averages around 240 µg/L upstream of the Argo.

The underlying table value standards of 59 and 65 µg/L Zn chronic and acute, respectively (@ 50 mg/L hardness) were not applied because: (1) the TVS are <u>not</u> legally applicable for Zn in this Clear Creek segment 11 as there is an existing ambient-based WQS, (2) the state may eventually establish a revised site specific water quality standard for zinc between 100-225 µg/L, and (3) the treatment technology is not expected to constantly achieve 45 µg/L zinc. The treatment plant will operate normally at half or less of the 225 µg/L Zn limit, but treatment of zinc is highly dependent on pH. At other similar treatment plants (i.e. Yak and Leadville Mine Drainage Tunnels), we have found zinc levels increase to 200-400 µg/L in response to small changes in pH.

ZINC (µg/L) SOURCE OF CRITERIA	CHRONIC CRITERIA	CHRONIC DISCHARGE LIMIT	ARAR STATUS	ACUTE CRITERIA	ACUTE DISCHARGE LIMIT	ARAR STATUS
Hardness based TVS	59 Dis	85 TRec	Rel.	65 Dis	94 TRec	Rel.
Several Trout Studies	100 - 150	145 - 217	TBC			
BPJ, protection of brown/brook trout	155	225 TRec	TBC			
Site Specific WQS, just upstream of Argo (Seg 2)	200 Dis	290 TRec	Rel.			
Future Site Specific WQS based on water quality after Argo Treatment Plant and other remediation.	Estimated between 150-300	Unknown at this time.				
Site Specific WQS at Argo (Seg 11) in ROD	300 TRec	300 TRec	L.Appl.			
Site Specific WQS at Argo (Seg 11) current	300 Dis	2010 TRec	L.Appl.			
CO - DOW Trout Criteria: Rainbow [5] Brown Brook	47 Dis 225 532-1368	68 326 770-2,000	TBC	240-800 Dis 640 2,000		TBC

FINAL DISCHARGE LIMITS AND MONITORING FOR ZINC

Chronic - monthly average limit based on: Protecting brown and brook trout = 225 µg/L	**Acute** - no limit
Monitoring - weekly, TRec Zn	

WHOLE EFFLUENT TOXICITY

Whole Effluent Toxicity (WET) limits and monitoring are required in this control mechanism to detect and eliminate toxicity in the event its presence is unknown, or caused by aluminum or interaction between otherwise innocuous substances. The requirements for WET testing are in accordance with the latest version of the "Region VIII Whole Effluent Toxics Control Program". The State of Colorado's Colorado Water Quality Control Division Biomonitoring guidance indicates that WET testing requirements are applicable to the Argo discharge because Clear Creek is classified as Class I Aquatic Life.

The instream Waste Concentration (IWC) is used to determine whether acute or chronic WET testing is required. The IWC is a ratio of the discharge flow rate and the chronic low flow for the receiving stream ($IWC = Q_2 / Q_1 + Q_2 \times 100$). If the IWC is less than or equal to 9.1%, acute conditions apply. The IWC for the Argo discharge is 4.4%; therefore this control mechanism will require quarterly acute toxicity testing using two species (Ceriodaphnia sp. and fathead minnows) starting January 1998. Starting October 1, 1998, the discharge limit shall be " no acute toxicity".

WET testing must be conducted on a an effluent dilution series (100%, 75%, 50%, 25%, 12.5%, 6.25% and 0% (control)). This dilution series is required to account for a potential increase in toxicity with a corresponding decrease in hardness. A change to a different dilution series or a reduction to the most critical dilutions may be allowed if deemed appropriate at a later date. Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentrations. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

CONVENTIONAL POLLUTANTS: OIL AND GREASE, TOTAL SUSPENDED SOLIDS, pH, & FLOW

The Colorado Regulations for Effluent Limitations (62), apply to the conventional pollutants. The limit for Oil and Grease is based on this regulation. Limits for total suspended solids (TSS) are based on Best Professional Judgement and are equivalent to the interim limits based on treatment technology for ore mining and milling. The pH limit of 6.5 - 9.0 is based on the aquatic life WQS.

Since the mass balance calculations use the maximum design capacity flow of 700 gpm, limits will be reevaluated if the plant is found to have greater capacity flow than 1.008 MGD (700 gpm). A firm flow limit was not included in the control mechanism, because the Argo Plant will be treating as much of the surges as possible while maintaining treatment performance.

Monitoring is required on a continuous or daily basis for flow and pH. Weekly monitoring is required for TSS and oil and grease.

ANTI DEGRADATION

Section 31.8 of the State of Colorado's Basic Standards and Methodologies for Surface Water requires an antidegradation review for regulated activities with new or increased water quality impacts that may degrade the quality of State surface waters classified as cold water aquatic life class 1 (the Clear Creek is classified as cold water aquatic life class 1). The antidegradation review is not applicable for the Argo Tunnel treatment plant discharge since the discharge is not a regulated activity as defined in section 31.8 (3) (a) and the discharge is not new. In addition, the diversion of the Argo Tunnel discharge through the treatment plant is anticipated to significantly improve the quality of Clear Creek.

Other Parameters Evaluated for Limits

Several other pollutants (beryllium, sulfate and fluoride) exceed the water quality standards in the untreated Argo discharge. These pollutants were evaluated further for discharge limits. However, after calculating discharge limits, it became apparent that the discharge without treatment would not exceed the possible limits. These pollutants have been dropped from further consideration.

Parameter	Concentration Argo Discharge	WQS	Possible Discharge Limit
Beryllium	12 -16 µg/L	4 µg/L	61 µg/L
Sulfate	1028 - 2560	250	5,000
Fluoride	1.3 - 3.5	2	31

Monitoring

Monitoring frequencies and duration are summarized in the table below. The specific parameters, frequencies and sources of samples are listed in Appendix Tables A-9, A-10, A-11 and A-12.

Routine monitoring was initially scheduled to start as the treatment plant came on line. However, start-up difficulties have delayed the monitoring schedule. The first year monitoring requirements will run from October 1, 1998 to September 30, 1990.

As part of the reopener provision in Part II, Section I, the control mechanism may be reopened based upon monitoring results of the Argo Tunnel treatment plant influent and effluent, and Clear Creek. In addition, the control mechanism may be reopened in the event a waste load allocation is completed for the Clear Creek or WQS are revised. However, it should be noted that requirements of the CERCLA and the NCP generally freeze performance standards at the time the Record of Decision is signed. This requirement is to ensure that an effective and efficient remedial action can be completed without continuously changing clean-up criteria.

Monitoring for Group 1 Pollutants (≈ Pollutants with Limits)

Effluent monitoring frequencies are generally set at weekly for Group 1 parameters (aluminum, arsenic, cadmium, copper, iron, manganese, nickel, lead, silver and zinc). Eventually, frequencies may be reduced to biweekly or monthly for certain parameters if the monitoring results show the treatment plant is consistently effective in treating the Argo Tunnel effluent and the pollutants in the effluent are below ARARs. Composite samples have been specified for all metals to account for variations in the effluent quality resulting from treatment plant operations. Flow and pH shall be monitored continuously or daily. Whole effluent toxicity shall be monitored quarterly. Monitoring for these parameters are "substantive" requirements under Superfund. Other effluent monitoring will be conducted for parameters with limited data, and indicator and watershed parameters.

Monitoring for Parameters with Limited Data

Additional influent and/or effluent monitoring will be conducted every other month for one year (6 monitoring events) for several parameters with limited data or poor detection limits (generally, Group 3 pollutants of concern). Based on the limited data, these pollutants did not need limits. This additional data will be used to reevaluate these parameters at the end of monitoring. Monitoring for these parameters are generally "substantive" requirements under Superfund.

Monitoring for Watershed or Indicator Pollutants

Influent and/or effluent monitoring will be conducted every other month for the first year of operation for indicator parameters or parameters of interest to the Upper Clear Creek Watershed or Standley Lake Users. After the first year, the indicator parameters will be monitored quarterly. These monitoring requirements are not considered "substantive" under Superfund.

Influent Monitoring

There are several reasons to monitor plant influent or the untreated Argo discharge: (1) EPA and the State will need to evaluate treatment plant removal efficiencies, (2) more information is needed for several parameters to confirm no limit decision, (3) identify changes in Argo Tunnel discharges (i.e. more or less metals over time, seasonal variability), (4) identify new mine discharges to the Argo Tunnel. Changes in nitrate and cyanide concentrations may indicate new mining. Oil and grease (effluent) monitoring also monitors new activity or dumping. These monitoring requirements are generally considered "substantive" under Superfund.

Influent monitoring will be every other month for the first year and quarterly thereafter for aluminum, arsenic, cadmium, copper, iron, nickel, lead, silver, zinc (all metals TRec except as noted) nitrite, nitrate and cyanide WAD (weak acid dissociable).

For one year the following parameters will be monitored every other month (6 monitoring events total) mercury (total), selenium, thallium, chromium, chromium $^{+6}$, uranium, radium 226 & 228, and gross alpha.

MONITORING SUMMARY			
Sample	**Parameter**	**Frequency**	**Duration**
Effluent	Metals with limits, O&G, hardness, TSS	Weekly	Long term
Effluent	pH, flow	Continuously, daily	Long term
Effluent	WET, TDS	Quarterly	Long term
Effluent	More information needed parameters	Every other month	9 Months
Effluent	Indicator parameters	Every other month 1st year, quarterly thereafter	Long term
Effluent	Watershed parameters	Every other month	One year
Influent	Metals with limits, pH, flow	Every other month 1st year, quarterly thereafter	Long term
Influent	More information parameters	Every other month	One year
Influent	Indicator/watershed parameters	Every other month 1st year, quarterly thereafter	Long term
By-pass	Metals with limits, O&G	Twice monthly	Long term
By-pass	pH, flow	Daily	Long term
Clear Creek Up&Down Stream	Metals with limits, pH flow, hardness, thallium	Every other month 1st year, quarterly thereafter	Long term
Clear Creek Up&Dwn	More information parameters	Every other month	First year
Clear Creek Up&Dwn	Watershed parameters	Every other month 1st year, quarterly thereafter	Long term

By-Pass Monitoring

During major (greater than 700 gpm) blow-out/high flow conditions, a portion of the Argo Tunnel discharge will by-pass the treatment plant. For more information, see the discussion of by-passes on page 11. No limits apply , but the by-pass will be monitored daily for pH and flow. The by-pass will also be monitored for the metals with limits during the first week, and every other week thereafter, during discharge. If the discharge is less than seven days, then no sample will be taken. By-pass samples may also serve as the influent sample for that month. These monitoring requirements are considered "substantive" under Superfund.

Instream Monitoring

Clear Creek water quality upstream and downstream of the Argo Tunnel discharge is to be monitored every other month for the first year and quarterly thereafter to determine comprehensive impacts on the receiving water. Clear Creek will be monitored at SW-7a upstream of the Argo Tunnel at the 23rd Street bridge and SW-5 at the Gilson Street bridge. The parameters to be monitored are listed in Table A-11.

In-stream monitoring for pollutants of concerns will be conducted until the control mechanism is amended or replaced. The number of parameters and the frequency of monitoring are likely to decrease in several years as the instream effects of the Argo Treatment Plant are documented and data gaps are filled. For pollutants with limited information, the monitoring will be for the first year only. For the majority of metals, both dissolved and total recoverable analysis will be conducted. In-stream sampling using both analytical techniques develops more data for the metals translator factor, evaluates in-stream compliance with ARARs, and provides data for evaluating the toxic effects of metals. In-stream winter monitoring need only be conducted when the stream is open. See Table A-12 for the parameters and frequency. Instream monitoring is a mixture of "substantive" and "administrative" requirements under Superfund.

Duration of ARARs Compliance Document:

The *ARARs Compliance Document*, including the specific discharge limits, monitoring and reporting requirement in Part II, the Discharge Control Mechanism will be reviewed at least every five years.

The *ARARs Compliance Document* may be reopened by EPA or State Superfund programs at any time based on monitoring results, waste load allocations, total maximum daily loads, WQS revisions or other new information.

ARARs Compliance Document:

Prepared By: Bruce Kent, EPA P2-W-P & Dana Allen, EPA EPR-EP

Reviewed by: Ron Abel & Rick Brown, CDPHE
Rob Eber, State AG Office
Holly Fliniau, EPA EPR-SR
Richard Baird, EPA ENF-L

Appendix A
Argo Tunnel ARARs Compliance Document
Data Tables

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Potential Limits[2] / Monitor?	Comment
Flow (cfs)	76/77	0.45	0.37 - 0.55	14	Treated3 WaterQual		L,M	
Flow (cfs)	OU1-FS	0.46	0.26 - 0.86	18				7/85-12/86
Flow (cfs)	RI-IA	0.21		1				4/87
Flow (cfs)	RI-II	0.45	0.41 - 0.49	2				6/89, 9/89
Flow (cfs)	SWSR	0.46		1				4/92
pH (s.u.)	76/77	2.9	2.9 - 3.1	14		6.5 - 9.0	L,M	
pH (s.u.)	OU1-FS	2.63	2.5 - 2.9	6				7/85- 6/86
pH (s.u.)	RI-IA	3.2		1				4/87
pH (s.u.)	RI-II	2.3	2.1 - 2.5	2				6/89, 9/89
Total Dis. Solids (mg/L)	76/77	2,950	2710 - 3110	11			N	
Total Dis. Solids (mg/l)	OU1-FS	3,465	3120 - 3990	5				7/85- 6/86
Total Dis. Solids (mg/L)	RI-II	3,300		1				6/89
Dis. Aluminum (µg/L)	OU1-FS	27,600	19,000-55,900	5		87/750	L,M	7/85- 6/86
Dis. Aluminum (µg/L)	RI-IA	23,200		1				4/87
Dis. Aluminum (µg/L)	RI-II	24,450	19,900-29,000	2				6/89, 9/89

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Total Aluminum (µg/L)	OU1-FS	19,600		5			OM	7/85- 6/86
Total Aluminum (µg/L)	RI-IA	23,200		1				4/87
Total Aluminum (µg/L)	RI-II	24,450	19,900-29,000	2				6/89, 9/89
Total Aluminum (µg/L)	RD	30,220	22,000-56,000	10				
Total Aluminum (µg/L)	SWSR	31,600		1				4/92
Dis. Antimony (µg/L)	76/77	0.6	0.0 - 2	14			N	
Dis. Antimony (µg/L)	OU1-FS	0.0	0.0 - 0.0	5				7/85- 6/86
Total Antimony (µg/L)	76/77	0.9	0.0 - 2	14		6.0	N	
Total Antimony (µg/L)	OU1-FS	0.0	0.0 - 0.0	5				7/85- 6/86
Total Antimony (µg/L)	SWSR	0.0		1				4/92
Dis. Arsenic (µg/L)	76/77	122	100 - 160	13		360/150	L,M	
Dis. Arsenic (µg/L)	OU1-FS	145	64 - 208	5				
Dis. Arsenic (µg/L)	RI-II	62.5	33 - 92	2				
Total Arsenic (µg/L)	76/77	135	100 - 180	14		50	L,M	
Total Arsenic (µg/L)	OU1-FS	132	71 - 226	5				7/85- 6/86

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Total Arsenic (µg/L)	RI-II	66.5	35 - 98	2				6/89, 9/89
Total Arsenic (µg/L)	SWSR	238		1				4/92
Dis. Barium (µg/L)	76/77	0.0	0.0 - 0.0	14				
Dis. Barium (µg/L)	OU1-FS	0.0	0.0 - 0.0	5				7/85- 6/86
Total Barium (µg/L)	76/77	?	?	?		1000	N	
Total Barium (µg/L)	OU1-FS	0.0	0.0 - 0.0	5				7/85- 6/86
Total Barium (µg/L)	SWSR	0.0		1				4/92
Dis. Beryllium (µg/L)	OU1-FS	13	12 - 16	5		4.0	L,M	7/85- 6/86
Total Beryllium (µg/L)	OU1-FS	13	12 - 14	5				7/85- 6/86
Total Beryllium (µg/L)	SWSR	15		1				4/92
Dis. Boron (µg/L)	OU1-FS	192	145 - 232	3			N	7/85- 6/86
Total Boron (µg/L)	OU1-FS	185	113 - 227	3		750	N	7/85- 6/86
Dis. Cadmium (µg/L)	76/77	151	130 - 170	11		1.8/3	L,M	

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Dis. Cadmium (µg/L)	OU1-FS	213	122 - 540	5				7/85- 6/86
Dis. Cadmium (µg/L)	RI-II	121.5	120 - 123	2				6/89, 9/89
Total Cadmium (µg/L)	76/77	151	130 - 170	13		5.0/10	L,M	
Total Cadmium (µg/L)	OU1-FS	255	111 - 770	5				7/85- 6/86
Total Cadmium (µg/L)	RI-II	121.5	120 - 123	2				6/89, 9/89
Total Cadmium (µg/L)	SWSR	178		1				4/92
Chromium 6+ (µg/L)	OU1-FS	4.6	0.0 - 18.6	4		16/11	OM	7/85- 6/86
Dis. Chromium (µg/L)	76/77	9	0.0 - 20	14		984/117	M 1st Y	
Dis. Chromium (µg/L)	OU1-FS	27	16 - 53	5				7/85- 6/86
Dis. Chromium (µg/L)	RI-II	107	0.0 - 214	2				6/89, 9/89
Total Chromium (µg/L)	76/77	16	0.0 - 30	14		50	M 1st Y	
Total Chromium (µg/L)	OU1-FS	26	0.0 - 62	5				7/85- 6/86
Total Chromium (µg/L)	RI-II	114	0.0 - 229	2				6/89, 9/89
Total Chromium (µg/L)	SWSR	18		1				4/92

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Dis. Cobalt (µg/L)	OU1-FS	179	133 - 318	5			N	7/85- 6/86
Total Cobalt (µg/L)	OU1-FS	171	122 - 296	5			N	7/85- 6/86
Total Cobalt (µg/L)	SWSR	158		1				4/92
Dis. Copper (µg/L)	76/77	5600	4300 - 6400	14		6.5/17	L,M	
Dis. Copper (µg/L)	OU1-FS	5685	4580 - 6720	5				7/85- 6/86
Dis. Copper (µg/L)	RI-II	4940	4780 - 5100	2				6/89, 9/89
Total Copper (µg/L)	76/77	5800	5000 - 6500	14		200	L,M	
Total Copper (µg/L)	OU1-FS	5410	4100 - 6290	5				7/85- 6/86
Total Copper (µg/L)	RI-II	4840	4780 - 4900	2				6/89, 9/89
Total Copper (µg/L)	RD	7760	5400-13000	10				
Total Copper (µg/L)	SWSR	6580		1				4/92
Total Cyanide (µg/L)	OU1-FS	0.0		2		5	OM	d.
Dis. Iron (mg/L)	76/77	166	160 - 190	14		0.3	L,M	

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Dis. Iron (mg/L)	OU1-FS	159	137 - 204	5				7/85- 6/86
Dis. Iron (mg/L)	RI-II	113	97 - 130	2				6/89, 9/89
Total Iron (mg/L)	76/77	179	160 - 200	13		1.0	L,M	
Total Iron (mg/L)	OU1-FS	155	132 - 197	6				7/85- 6/86
Total Iron (mg/L)	RI-II	115	100 - 130	2				6/89, 9/89
Total Iron (mg/l)	RD	186	130 - 328	10				
Total Iron (mg/l)	SWSR	189		1				4/92
Dis. Lead (µg/L)	76/77	29	15 - 40	14		31/1.5	L,M	
Dis. Lead (µg/L)	OU1-FS	111	11 - 292	5				7/85- 6/86
Dis. Lead (µg/L)	RI-II	9		1				6/89
Total Lead (µg/L)	76/77	77	<100 - 200	14		50	L,M	
Total Lead (µg/L)	OU1-FS	100	17 - 262	5				7/85- 6/86
Total Lead (µg/L)	RI-II	8		1				
Total Lead (µg/L)	SWSR	18.9		1				4/92
Dis. Manganese (mg/L)	76/77	93	82 - 120	14		0.050	L,M	
Dis. Manganese (mg/L)	OU1-FS	100	77.7 - 149	5				7/85- 6/86

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4] / Monitor?	Limits[2] /	Comment
Dis. Manganese (mg/L)	RI-II	76.4	73 - 79.9	2				
Total Manganese (mg/L)	76/77	94	80 - 110	14		1.0	L,M	
Total Manganese (mg/L)	OU1-FS	95	78.6 - 140	5				7/85- 6/86
Total Manganese (mg/L)	RI-II	77	74 - 79.9	2				6/89, 9/89
Total Manganese (mg/L)	SWSR	128		1				4/92
Total Manganese (mg/l)	RD	102	76 - 134	10				
Dis. Mercury (µg/L)	76/77	0.0	0.0 - 0.2	14		0.1/2.4	M 1st Y	f.
Dis. Mercury (µg/L)	OU1-FS	0.0		5				7/85- 6/86
Total Mercury (µg/L)	76/77	0.0	0.0 - 0.2	14		0.01	M 1st Y	
Total Mercury (µg/L)	OU1-FS	0.0		5				7/85- 6/86
Total Mercury (µg/L)	SWSR	0.0		1				4/92
Dis. Molybdenum (µg/L)	76/77	0	0 - 2	14			N	
Dis. Molybdenum (µg/L)	OU1-FS	0.0		3				7/85- 10/85
Dis. Molybdenum (µg/L)	RI-II	0.0		2				6/89, 9/89

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Total Molydbenum (µg/L)	76/77	0.5	0 - 2	14			N	
Total Molydbenum (µg/L)	OU1-FS	0.0		3				7/85-10/85
Total Molydbenum (µg/L)	RI-II	0.0		2				6/89, 9/89
Dis. Nickel (µg/L)	OU1-FS	309	187 - 628	5		56/545	L,M	7/85- 6/86
Dis. Nickel (µg/L)	RI-II	278	260 - 297	2				6/89, 9/89
Total Nickel (µg/L)	OU1-FS	295	191 - 610	5		100	L,M	7/85- 6/86
Total Nickel (µg/L)	RI-II	288	270 - 307	2				6/89, 9/89
Total Nickel (µg/L)	SWSR	240		1				4/92
Dis. Selenium (µg/L)	76/77	0	0	14		5/20	M 1st Y	a.
Dis. Selenium (µg/L)	OU1-FS	0		5				7/85- 6/86
Total Selenium (µg/L)	76/77	0	0	14		20	M 1st Y	
Total Selenium (µg/L)	OU1-FS	0.0		5				7/85- 6/86
Total Selenium (µg/L)	SWSR	0.0		1				4/92

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Dis. Silver (µg/L)	76/77	0	0	14		0.02/0.62	L,M	
Dis. Silver (µg/L)	OU1-FS	3.2	0.0 - 8.4	4				7/85- 6/86
Dis. Silver (µg/L)	RI-II	0.0	-	1				6/89
Total Silver (µg/L)	76/77	11	<10 - 60	14		100	see diss.	
Total Silver (µg/L)	OU1-FS	48.7	0.0 - 145	5				7/85- 6/86
Total Silver (µg/L)	RI-II	0.0	-	1				6/89
Total Silver (µg/L)	SWSR	0.0		1				4/92
Dis. Strontium (µg/L)	OU1-FS	1247	1020 - 1390	3			N	7/85-10/85
Total Strontium (µg/L)	OU1-FS	1198	947 - 1340	3			N	7/85- 6/86
Dis. Thallium (µg/L)	OU1-FS	2	0.0 - 10	5		15	M 1st Y	7/85- 6/86
Total Thallium (µg/L)	OU1-FS	2	0.0 - 10	5		0.5	M 1st Y	7/85- 6/86
Total Thallium (µg/L)	SWSR	0.0		1				4/92
Dis. Tin (µg/L)	OU1-FS	3.4	0.0 - 17	5			N	7/85- 6/86

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4] / Monitor?	Limits[2] /	Comment
Total Tin (µg/L)	OU1-FS	6.8	0.0 - 34	5			N	7/85- 6/86
Dis. Vanadium (µg/L)	OU1-FS	9.8	0.0 - 40	5			N	7/85- 6/86
Total Vanadium (µg/L)	OU1-FS	5.0	0.0 - 25	5			N	7/85- 6/86
Total Vanadium (µg/L)	SWSR	0.0		1				4/92
Dis. Zinc (µg/L)	76/77	44,000	40,000-50,000	13		65.0/58.9	L,M	
Dis. Zinc (µg/L)	OU1-FS	58,770	42,500 - 116,000	5				7/85- 6/86
Dis. Zinc (µg/L)	RI-IA	44,400		1				4/87
Dis. Zinc (µg/L)	RI-II	41,150	41,000-41,300	2				6/89, 9/89
Total Zinc (µg/L)	76/77	44,500	40,000-49,000	14		200	L,M	
Total Zinc (µg/L)	OU1-FS	55,450	37,800- 108,000	5				7/85- 6/86
Total Zinc (µg/L)	RI-IA	43,500		1				4/87
Total Zinc (µg/L)	RI-II	41,700	41,400-42,000	2				6/89, 9/89
Total Zinc (µg/L)	RD	52,900	41,000-75,500	10				
Total Zinc (µg/L)	SWSR	54,600		1				4/92

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Radium	no data						M 1st Y	
Total Uranium	no data						M 1st Y	
Gross Alpha	no data						M 1st Y	
Dis. Sulfate (mg/L)	76/77	2010	1900 - 2300	13		250	M 1st Y	c.
Sulfate (mg/L)	OU1-FS	2032	1028 - 2560	4				
Sulfate (mg/L)	RI-II	2045	2020 - 2070	2				
Fluoride (mg/l)	OU1-FS	2.4	1.3 - 3.5	5		2.0	M 1st Y	
Fluoride (mg/l)	RI-II	3.5		1				
Chloride (mg/l)	OU1-FS	6.3	0.0 - 25.0	5		250	M 1st Y	
Chloride (mg/l)	RI-II	9.4		1				
Phosphate (mg/l)	no data							
Phosphorous (mg/l)	RI-II	.08		1			M 1st Y	e.
Nitrite (mg/l)	no data					0.05	M 1st Y	
Nitrate (mg/l)	RI-II	< .01		1			OM	d.

ARGO TUNNEL - WATER QUALITY DATA								
Parameter	Data Source	Average [1]	Range	# of Samples	Treated[3] WaterQual	Potential Triggers[4]	Limits[2] / Monitor?	Comment
Nitrate/Nitrite (mg/l)	76/77	0.02	0 → .22	12		10		
Nitrate/Nitrite (mg/l)	OU1-FS	0.06	0.0 - 0.28	4				
Whole Effluent Toxicity (Ceriodaphnia)	RI-II	LC-50 = 0.14%		1			L,M	6/89
Whole Effluent Toxicity (Fathead minnows)	RI-II	LC-50 = 0.65%		1			L,M	6/89

Data Sources for ARGO Tunnel Upstream & Downstream Data

76/77 USGS data March 11, 1976 - March 18, 1977. Pre-blow-out conditions.
OU1-FS Superfund date (CDM) four samples taken between July 1985 and June 1986. Feasibility Sudy Report OU 1 Argo Tunnel Discharge Control, August 1, 1988, from Table 1-1.
RI-IA Final draft Remedial Investigation Report Addendum, samples taken in April 1987,(January 1988).
RI-II Superfund data June 13, 1989 and September 19, 1989 from Clear Creek Phase II Remedial Investigation, September 21, 1990.
SWSR Surface Water Sampling Report, samples taken in April 1992, (1994).
UCCWA Upper Clear Creek Watershed Association.
START EPA - Superfund START Program contract.
RD CDPHE - Data collected for Remedial Design.

NOTES

[1] Averaged using zero for values below the detection limits.

[2] L,M - Limit and monitoring for Parameter
M - Monitoring Only
OM - Occasional Monitoring
M 1stY- Monitor 1st Year
N - No Limits or Monitoring

[3] No data to date on Argo Treatment performance.

[4] Triggers are water quality critera, standards or advisories.

COMMENTS

a. Selenium - Selenium confirm date w/more recent monitoring.
b. Aluminum - Possible limit or may control with WET limits as was done at Climax Urad.
c. Sulfate - WLA needed.
d. Nitrate & Cyanide - Indicators of mining activity, especially new activity affecting Argo water quality. Nitrate also of concern to Standley Lake users.
e. Phosphorous - Basin concern for Standley Lake users.

CLEAR CREEK - UPSTREAM QUALITY (CC-25) - MAINSTEM ABOVE WEST FORK (1994 - 1996)

Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Flow (cfs)	UCCWA	173	13 - 791	16			
pH (s.u.)	UCCWA	7.68	7.26 - 8.33	24	6.5 - 9.0		
Diss. Solids (mg/l)	no data						
Dis. Aluminum (µg/l)	UCCWA	34.4	<10 - 67	23	750 (ac) 87 (ch)		
Total Aluminum (µg/l)	UCCWA	200	<10 - 1651	22			
Dis. Antimony (µg/l)	UCCWA	0.0	<40 - <50	9			
Total Antimony (µg/l)	UCCWA	0.0	<40 - <50	8			
Dis. Arsenic (µg/l)	UCCWA	31.5	0.8 - 50	22	360 (ac) 150 (ch)		
Total Arsenic (µg/l)	UCCWA	31.5	0.8 - 50	22	100 (ch)TR		

CLEAR CREEK - UPSTREAM QUALITY (CC-25) - MAINSTEM ABOVE WEST FORK (1994 - 1996)

Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Dis. Barium (µg/l)	UCCWA	36.0	22.5 - 50.6	8			
Total Barium (µg/l)	UCCWA	37.8	23.4 - 55.6	8			
Dis. Beryllium (µg/l)	UCCWA	1.4	1 - 2.0	9			
Total Beryllium (µg/l)	UCCWA	1.4	1 - 2.0	9			
Dis. Cadmium (µg/l)	UCCWA	. 0.24	<0.5 - 1.2	23	TVS (ac (tr)),ch)		
Total Cadmium (µg/l)	UCCWA	1.7	<0.5 - 27	22	10 (ch)		
Dis. Calcium (mg/l)	UCCWA	14.3	6.96 - 22.22	18			
Total Calcium (mg/l)	UCCWA	15.8	13.1 - 19.3	7			
Dis. Chromium (µg/l)	UCCWA	4.5	4.0 - 5.0	10	TVS Cr III (ac,ch)		
Total Chromium (µg/l)	UCCWA	4.6	4.0 - 5.7	9	100 TRec		
Chromium 6+ (µg/l)	no data				TVS Cr 6+ (ac,ch)		
Dis. Cobalt (µg/l)	UCCWA	0.0	<5 - <6.0	9			
Total Cobalt (µg/l)	UCCWA	0.0	<5 - 6.0	8			

CLEAR CREEK - UPSTREAM QUALITY (CC-25) - MAINSTEM ABOVE WEST FORK (1994 - 1996)							
Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Dis. Copper (µg/l)	UCCWA	0.3	<0.5 - 1.8	23	TVS (ac,ch)		
Total Copper (µg/l)	UCCWA	2.5	1.0 - 12	22	200 TRec		
Dis. Iron (µg/l)	UCCWA	35.7	<5 - 98.4	23			
Total Iron (µg/l)	UCCWA	330	141 - 1458	22	1000 TRec		
Dis. Lead (µg/l)	UCCWA	9.5	0.8 - 40	23	TVS (ac,ch)		
Total Lead (µg/l)	UCCWA	11.6	0.8 - 40	22			
Dis Magnesium (mg/l)	UCCWA	4.6	2.08 - 7.17	18			
Total Magnesium (mg/l)	UCCWA	5.2	4.01 - 6.0	7			
Dis. Manganese (µg/l)	UCCWA	23.1	11.2 - 45.2	23			
Total Manganese (µg/l)	UCCWA	35.8	17 - 84	22	1000 TRec		
Dis. Molybdenum (µg/l)	UCCWA	7.1	5.0 - 8	10			
Total Molybdenum (µg/l)	UCCWA	7.1	5.0 - 8	10			
Dis. Nickel (µg/l)	UCCWA	1.0	6.9 - 16	23	TVS (ac,ch)		
Total Nickel (µg/l)	UCCWA	0.0	<5.0 - <15.0	22	200 TRec		

CLEAR CREEK - UPSTREAM QUALITY (CC-25) - MAINSTEM ABOVE WEST FORK (1994 - 1996)							
Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Dis. Potassium (mg/l)	UCCWA	1.4	<0.65 - 2.46	9			
Total Potassium (mg/l)	UCCWA	1.7	1.00 - 2.20	4			
Dis. Selenium (µg/l)	UCCWA	37.1	1 - 85	22	5/20		
Total Selenium (µg/l)	UCCWA	37.1	1 - 85	22	20 (ch)		
Dis. Sodium (mg/l)	UCCWA	4.2	1.92 - 9.35	9			
Total Sodium (mg/l)	UCCWA	3.9	2.89 - 5.20	4			
Dis. Silver (µg/l)	UCCWA	2.5	0.2 - 5	20	TVS (ac) TVS (ch(tr))	eff.3/2/98	
Total Silver (µg/l)	UCCWA	2.3	0.2 - 5	19			
Dis. Thallium (µg/l)	UCCWA	60.1	50 - 85.0	9	15 (ch)		

CLEAR CREEK - UPSTREAM QUALITY (CC-25) - MAINSTEM ABOVE WEST FORK (1994 - 1996)							
Total Thallium (µg/l)	UCCWA	60.1	50 - 85.0	9	0.5 TRec		
Dis. Vanadium (µg/l)	UCCWA	0.0	<4.0	8			
Total Vanadium (µg/l)	UCCWA	0.0	<4.0	8			

Dis. Zinc (µg/l)	UCCWA	217	64 - 447	23	TVS (ac)		
Total Zinc (µg/l)	UCCWA	242	92 - 484	22	200 (ch)		
Dis. Phosphorous (mg/l)	UCCWA	0.0089	0.00125 - 0.0373	22			
Total Phosphorous (mg/l)	UCCWA	0.0191	0.0051 - 0.0490	21			
Chloride (mg/l)	UCCWA	10.7	2.0 - 23.0	11			
Ammonia-N (mg/l)	UCCWA	0.06	0.005 - 0.26	23	TVS (ac) 0.02 (ch)		
Nitrate/Nitrite (mg/l)	UCCWA	0.21	0.11 - 0.37	23	NO2 0.05 NO3 100		
Hardness (mg/l) (dis.)	UCCWA	63.3	25.7 - 264	16			
Hardness (mg/l) (tot.)	UCCWA	43.6	26.2 - 69	3			

CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Flow (cfs)	RI-II	111		1			9/89
Flow (cfs)	START	87.5		1			
pH (s.u.)	OU1-FS	6.75		4	6.5 - 9.0		
pH (s.u.)	RI-II	6.85	6.5 - 7.2	2			6/89, 9/89
pH (s.u.)	START	7.62		1			
Diss. Solids (mg/l)	RI-II	56.0		1			6/89
Dis. Aluminum (µg/l)	OU1-FS	174		4	750/87		
Dis. Aluminum (µg/l)	RI-II	0.0	<120 - <500	2			6/89, 9/89
Dis. Aluminum (µg/l)	START	81		1			
Total Aluminum (µg/l)	OU1-FS	237		4			
Total Aluminum (µg/l)	RI-II/ RD	220	<0.05 - 670	11			
Total Aluminum (µg/l)	START	150		1			
Dis. Arsenic (µg/l)	OU1-FS	4.75		4	360/150		
Dis. Arsenic (µg/l)	RI-II	0.0	<1.0 - <10.0	2			6/89, 9/89

CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Dis. Arsenic (µg/l)	START	<0.8		1			

CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Total Arsenic (µg/l)	OU1-FS	4.75		4	100 TRec		
Total Arsenic (µg/l)	RI-II	0.0	<1.0 - <10.0	2			6/89, 9/89
Total Arsenic (µg/l)	START	<0.8		1			
Dis. Cadmium (µg/l)	OU1-FS	4		4	TVS (ac (tr),ch)		
Dis. Cadmium (µg/l)	RI-II	0.0	<14.0 - <25.0	2			6/89, 9/89
Dis. Cadmium (µg/l)	START	0.60		1			
Total Cadmium (µg/l)	OU1-FS	4		4	10(ch)		
Total Cadmium (µg/l)	RI-II	0.0	<14.0 - <25.0	2			6/89, 9/89
Total Cadmium (µg/l)	START	1.10		1			
Dis. Calcium (mg/l)	RI-II	10.1	9.3 - 10.8	2			6/89, 9/89
Total Calcium (mg/l)	START	14.3		1			
Total Calcium (mg/l)	RI-II	10.0	9.2 - 10.0	2			6/89, 9/89
Dis. Chromium (µg/l)	OU1-FS	5.00		4	TVS(ac,ch)		

Dis. Chromium (µg/l)	RI-II	0.0	<23.0 - <50.0	2			6/89, 9/89
Total Chromium (µg/l)	OU1-FS	5.00		4	100 TRec		
CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Total Chromium (µg/l)	RI-II	0.0	<23.0 - <50.0	2			6/89, 9/89
Chromium 6+ (µg/l)	no data						
Dis. Copper (µg/l)	OU1-FS	10		4	TVS (ac,ch)		
Dis. Copper (µg/l)	RI-II	17 rev. 8/98		2			6/89, 9/89
Dis. Copper (µg/l)	START	13		1			
Total Copper (µg/l)	OU1-FS	17		4	200 TRec		
Total Copper (µg/l)	RI-II/ RD	15.0	3.5 - 28	11			
Total Copper (µg/l)	START	18		1			
Dis. Iron (µg/l)	START	96		1			
Dis. Iron (µg/l)	RI-II	105	30.0 - 180	2			6/89, 9/89
Total Iron (µg/l)	RI-II/ RD	298	130 - 740	11	1000 TRec		
Total Iron (µg/l)	START	269		1			

Dis. Lead (µg/l)	OU1-FS	3.00		4	TVS (ac,ch)		
Dis. Lead (µg/l)	RI-II	0.0	<5.00	1			6/89
Dis. Lead (µg/l)	START	<0.8		1			
Total Lead (µg/l)	OU1-FS	5.38		4	100 TRec		

CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Total Lead (µg/l)	RI-II	0.0	<5.00	2			6/89
Total Lead (µg/l)	START	2.7		1			
Dis Magnesium (mg/l)	RI-II	2.84	2.20 - 3.47	2			6/89, 9/89
Total Magnesium (µg/l)	RI-II	2.83	2.10 - 3.55	2			6/89, 9/89
Total Magnesium (µg/l)	START	4.37		1			
Dis. Manganese (µg/l)	OU1-FS	938		4			
Dis. Manganese (µg/l)	RI-II	514	467 - 570	2			6/89, 9/89
Dis. Manganese (µg/l)	START	196		1			
Total Manganese (µg/l)	OU1-FS	929		4	1000 TRec		
Total Manganese (µg/l)	RI-II/ RD	291	96 - 610	11			

Total Manganese (µg/l)	START	207		1			
Dis. Nickel (µg/l)	OU1-FS	15		4	TVS (ac,ch)		
Dis. Nickel (µg/l)	RI-II	23.5	47.0 - <50.0	2			6/89, 9/89
Dis. Nickel (µg/l)	START	<10		1			
Total Nickel (µg/l)	OU1-FS	10		4	200 TRec		
Total Nickel (µg/l)	RI-II	25.0	50.0 - <50.0	2			6/89, 9/89
CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Total Nickel (µg/l)	START	<10		1			
Dis. Selenium (µg/l)	no data				20 (ac) 5 (ch)		
Total Selenium (µg/l)	no data				20 (ch)		
Total Sodium (mg/l)	RI-II	6.6	5.3 - 7.91	2			6/89, 9/89
Dis. Sodium (mg/l)	START	10.5		1			
Total Sodium (mg/l)	RI-II	6.04	4.2 - 7.87	2			6/89, 9/89
Dis. Zinc (µg/l)	OU1-FS	246		4	TVS (ac)		

Dis. Zinc (µg/l)	RI-II	218	200 - 236	2			6/89, 9/89
Dis. Zinc (µg/l)	START	214		1			
Total Zinc (µg/l)	OU1-FS	252		4	200 (ch)		
Total Zinc (µg/l)	RI-II/ RD	315	73 - 760	11			6/89, 9/89
Total Zinc (µg/l)	START	240		1			
Dis. Silver (µg/l)	OU1-FS	2.30		4	TVS (ac) TVS (ch(tr)	Eff. 3/2/98	
Dis. Silver (µg/l)	RI-II	0.0	<25.0	1			6/89
CLEAR CREEK - UPSTREAM QUALITY (SW-07) - 150 METERS BELOW CHICAGO CREEK							
Dis. Silver (µg/l)	START	<0.2		1			
Total Silver (µg/l)	OU1-FS	2.30		4			
Total Silver (µg/l)	RI-II	0.0	<25.0	1			6/89
Total Silver (µg/l)	START	<0.2		1			
Dis. Phosphate (mg/l)	START	<0.04		1			
Total Phosphate (mg/l)	no data						
Sulfate (mg/l)	RI-II	19.2	13.3 - 25.2	2			6/89, 9/89
Sulfate (mg/l)	OU1-FS	36		4			

Sulfate (mg/l)	START	31.1		1			
Chloride (mg/l)	RI-II	2.0	4.0 - <5.0	2			6/89, 9/89
Chloride (mg/l)	START	6.06		1			
Ammonia-N (mg/l)	START	<0.05		1	TVS (ac) 0.02 (ch)		
Nitrate (mg/l)	RI-II	0.04		1	100		9/89
Nitrate/Nitrite (mg/l)	START	0.14		1	0.05 - NO2		
Fluoride (mg/l)	OU1-FS	0.76		4			
Fluoride (mg/l)	RI-II	0.56		1			6/89
Fluoride (mg/l)	START	0.69		1			
Hardness (mg/l)	START	53.7		1			

CLEAR CREEK - UPSTREAM QUALITY (SW-07A) - BELOW VIRGINIA CANYON

Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Flow (cfs)	RD						
Total Aluminum (µg/l)	RD	253	<0.05 - 916	14			
Total Copper (µg/l)	RD	22.6	3.7 - 101	14			
Total Iron (µg/l)	RD	321	130 - 835	14			

Total Manganese (µg/l)	RD	461	97 - 1120	14			
Total Zinc (µg/l)	RD	310	83 - 758	14			

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Flow (cfs)	RI-II	110		1			9/89
Flow (cfs)	START	94		1			
pH (s.u.)	OU1-FS	6.02		4	6.5 - 9.0		
pH (s.u.)	RI-II	6.75	6.5 - 7.0	2			6/89, 9/89
pH (s.u.)	START	7.84		1			
Diss. Solids (mg/l)	RI-II	65.0		1			6/89
Dis. Aluminum (µg/l)	OU1-FS	219		4	750/87		
Dis. Aluminum (µg/l)	RI-II	0.0	<120 - <500	2			6/89, 9/89
Dis. Aluminum (µg/l)	START	<40		1			
Total Aluminum (µg/l)	OU1-FS	958		4			
Total Aluminum (µg/l)	RI-II/ RD	686	<0.05 - 2350	16			
Total Aluminum (µg/l)	START	410		1			
Dis. Arsenic (µg/l)	OU1-FS	4.75		4	360/150		
Dis. Arsenic (µg/l)	RI-II	0.0	<1.0 - <10.0	2			6/89, 9/89

Dis. Arsenic (µg/l)	START	<0.8		1			

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Total Arsenic (µg/l)	OU1-FS	4.75		4	50 TRec		
Total Arsenic (µg/l)	RI-II	0.0	<1.0 - <10.0	2			6/89, 9/89
Total Arsenic (µg/l)	START	<0.8		1			
Dis. Cadmium (µg/l)	OU1-FS	6		4	TVS ac(tr) 3(ch)		
Dis. Cadmium (µg/l)	RI-II	0.0	<14.0 - <25.0	2			6/89, 9/89
Dis. Cadmium (µg/l)	START	2.00		1			
Total Cadmium (µg/l)	OU1-FS	4		4	5(ac)		
Total Cadmium (µg/l)	RI-II	0.0	<14.0 - <25.0	2			6/89, 9/89
Total Cadmium (µg/l)	START	2.50		1			
Dis. Calcium (mg/l)	RI-II	10.4	8.9 - 11.8	2			6/89, 9/89
Total Calcium (mg/l)	START	16.4		1			
Total Calcium (mg/l)	RI-II	10.7	9.2 - 12.2	2			6/89, 9/89
Dis. Chromium (µg/l)	OU1-FS	5.25		4	TVS CrIII		
Dis. Chromium (µg/l)	RI-II	0.0	<23.0 - <50.0	2			6/89, 9/89

Total Chromium (µg/l)	OU1-FS	5.00		4	50 (ac)		
Total Chromium (µg/l)	RI-II	0.0	<23.0 - <50.0	2			6/89, 9/89
Chromium 6+ (µg/l)	no data				16/11		

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Dis. Copper (µg/l)	OU1-FS	57		4	TVS(ac), 17 ch		
Dis. Copper (µg/l)	RI-II	8.5	17.0 - <50.0	2			6/89, 9/89
Dis. Copper (µg/l)	START	14		1			
Total Copper (µg/l)	OU1-FS	158		4	200 Trec 1000 (ch)		
Total Copper (µg/l)	RI-II/ RD	114	0.0078 - 567	16			
Total Copper (µg/l)	START	71		1			
Dis. Iron (µg/l)	START	28		1	300 (ch)		
Dis. Iron (µg/l)	RI-II	135	<30.0 - 270	2			6/89, 9/89
Total Iron (µg/l)	RI-II/ RD	2950	120 - 17000	16	1000 TRec		
Total Iron (µg/l)	START	1480		1			
Dis. Lead (µg/l)	OU1-FS	3.00		4	TVS (ac,ch)		

Dis. Lead (µg/l)	RI-II	0.0	<5.00	1			6/89
Dis. Lead (µg/l)	START	<0.8		1			
Total Lead (µg/l)	OU1-FS	7.18		4	50 TRec		
Total Lead (µg/l)	RI-II	0.0	<5.00	1			6/89
Total Lead (µg/l)	START	2.9		1			

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Dis Magnesium (mg/l)	RI-II	2.71	2.20 - 3.22	2			6/89, 9/89
Total Magnesium (mg/l)	RI-II	2.95	2.10 - 3.80	2			6/89, 9/89
Total Magnesium (mg/l)	START	5.31		1			
Dis. Manganese (µg/l)	OU1-FS	3521		4	50 (ch)		
Dis. Manganese (µg/l)	RI-II	544	448 - 640	2			6/89, 9/89
Dis. Manganese (µg/l)	START	858		1			
Total Manganese (µg/l)	OU1-FS	34678		4	1000 TRec		
Total Manganese (µg/l)	RI-II/ RD	2044	170 - 12200	16			6/89, 9/89
Total Manganese (µg/l)	START	860		1			
Dis. Nickel (µg/l)	OU1-FS	13		4	TVS		

					(ac,ch)		
Dis. Nickel (µg/l)	RI-II	0.0	<12.0 - <50.0	2			6/89, 9/89
Dis. Nickel (µg/l)	START	<10		1			
Total Nickel (µg/l)	OU1-FS	14		4	100 TRec		
Total Nickel (µg/l)	RI-II	0.0	<12.0 - <50.0	2			6/89, 9/89
Total Nickel (µg/l)	START	<10		1			

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Dis. Selenium (µg/l)	no data				20 (ac) 5 (ch)		
Total Selenium (µg/l)	no data				10 (ch)		
Dis. Sodium (mg/l)	RI-II	6.16	4.2 - 8.12	2			
Dis. Sodium (mg/l)	START	10.3		1			
Total Sodium (mg/l)	RI-II	5.98	3.8 - 8.15	2			6/89, 9/89
Dis. Zinc (µg/l)	OU1-FS	1565		4	TVS (ac) 300 (ch)		
Dis. Zinc (µg/l)	RI-II	201	161 - 240	2			6/89, 9/89
Dis. Zinc (µg/l)	START	538		1			
Total Zinc (µg/l)	OU1-FS	1560		4	2000 (ch)		
Total Zinc (µg/l)	RI-II/ RD	1073	100 - 5570	16			6/89, 9/89
Total Zinc (µg/l)	START	625		1			
Dis. Silver (µg/l)	OU1-FS	2.30		4	TVS (ac) TVS (ch)	Eff. 3/2/98	
Dis. Silver (µg/l)	RI-II	0.0	<25.0	1			6/89
Dis. Silver (µg/l)	START	<0.2		1			

CLEAR CREEK - DOWNSTREAM QUALITY (SW-05) - 50 METERS BELOW ARGO							
Total Silver (µg/l)	OU1-FS	2.30		4	100 (ac)		
Total Silver (µg/l)	RI-II	0.0	<25.0	1			6/89
Total Silver (µg/l)	START	<0.2		1			
Dis. Phosphate (mg/l)	START	<0.04		1			
Total Phosphate (mg/l)	no data						
Sulfate (mg/l)	RI-II	26.9	17.3 - 36.5	2	250		6/89, 9/89
Sulfate (mg/l)	OU1-FS	97		4			
Sulfate (mg/l)	START	43.2		1			
Chloride (mg/l)	RI-II	1.85	3.7 - <5.0	2	250		6/89, 9/89
Chloride (mg/l)	START	5.63		1			
Ammonia-N (mg/l)	START	<0.05		1	TVS (ac) 0.02 (ch)		
Nitrate (mg/l)	RI-II	0.39		1	10		9/89
Nitrate/Nitrite (mg/l)	START	0.13		1	0.05 NO2		
Fluoride (mg/l)	OU1-FS	0.70		4	2.0 (ac)		
Fluoride (mg/l)	RI-II	0.56		1			6/89

Fluoride (mg/l)	START	0.69		1			
Hardness (mg/l)	START	62.8		1			

CLEAR CREEK - DOWNSTREAM QUALITY (STORET 000132) - BELOW IDAHO SPRINGS (1/86 - 7/95)

Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
pH (s.u.)	ID SPGS	7.5	6.5 - 8.6	104			
Ammonia-N (mg/l)	ID SPGS	0.07	<0.1 - 0.53	103			
Total Hardness (mg/l)	ID SPGS	84.7	24 - 160	105			
Dis. Cadmium (µg/l)	ID SPGS	1.7	0.4 - 8	77			
Total Cadmium (µg/l)	ID SPGS	2.6	<0.3 - 7	30			
Dis. Copper (µg/l)	ID SPGS	15.7	8 - 56	77			
Total Copper (µg/l)	ID SPGS	91	18 - 270	21			
Dis. Iron (µg/l)	ID SPGS	143	14 - 1200	41			
Total Iron (µg/l)	ID SPGS	1265	12 - 6170	57			
Dis. Lead (µg/l)	ID SPGS	0.04	<1 - 3	68			

Total Lead (µg/l)	ID SPGS	1.3	<5 - 8	30			
Dis. Manganese (µg/l)	ID SPGS	1080	150 - 2600	77			

CLEAR CREEK - DOWNSTREAM QUALITY (STORET 000132) - BELOW IDAHO SPRINGS (1/86 - 7/95)							
Dis. Mercury (µg/l)	ID SPGS	0.0	<0.02 - <0.02	28			
Dis. Zinc (µg/l)	ID SPGS	408	110 - 1100	77			
Total Zinc (µg/l)	ID SPGS	698	150 - 2550	30			

CLEAR CREEK - DOWNSTREAM QUALITY (CC-40) - MAINSTEM BELOW IDAHO SPRINGS (1994 - 1996)							
Parameter	Data Source	Average	Range	# of Samples	Triggers	Limits/ Monitoring	Comment
Flow (cfs)	UCCWA	439	30 - 1700	16			
pH (s.u.)	UCCWA	7.59	7.23 - 7.90	23			
Diss. Solids (mg/l)	no data						
Dis. Aluminum (µg/l)	UCCWA	46.2	<30 - 113	22	750 (ac) 87 (ch)		
Total Aluminum (µg/l)	UCCWA	915	114 - 5663	21			
Dis. Antimony (µg/l)	UCCWA	0.0	<40 - <50	8	6.0 (ws)		
Total Antimony (µg/l)	UCCWA	0.0	<40 - <50	7			
Dis. Arsenic (µg/l)	UCCWA	30.6	0.8 - 50	21	360/150		
Total Arsenic (µg/l)	UCCWA	30.8	1 - 50	21	50 TRec		
Dis. Barium (µg/l)	UCCWA	26.1	17.3 - 33.6	7			
Total Barium (µg/l)	UCCWA	29.3	20.8 - 36.2	7			
Dis. Beryllium (µg/l)	UCCWA	1.5	1 - 2.0	8			
Total Beryllium (µg/l)	UCCWA	1.5	1 - 2.0	8			

Dis. Cadmium (µg/l)	UCCWA	1.2	<0.5 - 5.8	22	TVS(ac(tr), 3 ch		
Total Cadmium (µg/l)	UCCWA	1.8	0.5 - 6.0	21	5 (ac)		

CLEAR CREEK - DOWNSTREAM QUALITY (CC-40) - MAINSTEM BELOW IDAHO SPRINGS (1994 - 1996)							
Dis. Calcium (mg/l)	UCCWA	16.7	6.58 - 26.51	17			
Total Calcium (mg/l)	UCCWA	18.6	13.1 - 23.02	7			
Dis. Chromium (µg/l)	UCCWA	4.4	4.0 - 5.0	9	TVS Cr III (ac, ch)		
Total Chromium (µg/l)	UCCWA	4.4	4.0 - 5.0	8			
Chromium 6+ (µg/l)	no data				16/11		
Dis. Cobalt (µg/l)	UCCWA	0.0	<5 - <6.0	8			
Total Cobalt (µg/l)	UCCWA	0.0	<5 - <6.0	7			
Dis. Copper (µg/l)	UCCWA	10.9	2.7 - 29.8	22	17 (ch)		
Total Copper (µg/l)	UCCWA	49.0	10.9 - 164.8	21	200 Trec 1000 (ch)		
Dis. Iron (µg/l)	UCCWA	50.4	<4.0 - 173	22	300 (ch)		
Total Iron (µg/l)	UCCWA	2084	336 - 12907	21	1000 (ch)		

Dis. Lead (µg/l)	UCCWA	8.3	0.8 - 40	22	TVS (ac, ch)		
Total Lead (µg/l)	UCCWA	13.2	1.1 - 59.5	21	50 TRec		
Dis Magnesium (mg/l)	UCCWA	4.76	1.77 - 7.13	17			
Total Magnesium (mg/l)	UCCWA	5.5	3.78 - 6.75	5			

CLEAR CREEK - DOWNSTREAM QUALITY (CC-40) - MAINSTEM BELOW IDAHO SPRINGS (1994 - 1996)							
Dis. Manganese (µg/l)	UCCWA	673	97.1 - 1585	22	50 (ch)		
Total Manganese (µg/l)	UCCWA	796	210.2 - 1766	21	1000 (ch)		
Dis. Molybdenum (µg/l)	UCCWA	8.3	5.0 - 16	9			
Total Molybdenum (µg/l)	UCCWA	9.0	5.4 - 14	9			
Dis. Nickel (µg/l)	UCCWA	0. 97	5.2 - 10	22	TVS (ac,ch)		19/22 no detects >10 ug/l
Total Nickel (µg/l)	UCCWA	0.25	5.3 - <15.0	21	100 (ch)		1 detect
Dis. Phosphorous (mg/l)	UCCWA	0.00562	0.00125 - 0.0187	21			
Total Phosphouous (mg/l)	UCCWA	0.03224	0.0066 - 0.0747	20			
Dis. Potassium (mg/l)	UCCWA	2.5	1.1 - 4.0	8			
Total Potassium (mg/l)	UCCWA	2.4	1.55 - 3.30	4			
Dis. Selenium (µg/l)	UCCWA	36.5	1 - 85.0	21	20 (ac) 5 (ch)		
Total Selenium (µg/l)	UCCWA	38.5	1 - 85.0	21	10 (ch)		
Dis. Silver (µg/l)	UCCWA	2.3	0.2 - 5	19	TVS (ac) TVS (ch)	Eff. 3/2/98	

Total Silver (µg/l)	UCCWA	2.2	0.2 - 5	18	100 (ws)		

CLEAR CREEK - DOWNSTREAM QUALITY (CC-40) - MAINSTEM BELOW IDAHO SPRINGS (1994 - 1996)							
Dis Sodium (mg/l)	UCCWA	14.8	6.14 - 25.99	8			
Total Sodium (mg/l)	UCCWA	13.8	9.46 - 19.6	4			
Dis. Thallium (µg/l)	UCCWA	61.4	1.3 - 85	8	15 (ac)		
Total Thallium (µg/l)	UCCWA	61.4	1.3 - 85	8	0.5 (ws)		
Dis. Vanadium (µg/l)	UCCWA	0.0	<4.0	7			
Total Vanadium (µg/l)	UCCWA	0.0	<4.0	7			
Dis. Zinc (µg/l)	UCCWA	376	101.6 - 1118	22	TVS (ac) 300 (ch)		
Total Zinc (µg/l)	UCCWA	523	155.0 - 1379	21	2000 (ch)		
Chlorides (mg/l)	UCCWA	9.64	1.0 - 13.8	10			
Ammonia -N (mg/l)	UCCWA	0.048	0.005 - 0.38	21	TVS (ac) 0.02 (ch)		
Nitrate/Nitrite (mg/l)	UCCWA	0.25	0.12 - 0.52	21	NO2 0.05 NO3 10.0		
Total Kjeldahl Nitrogen (mg/l)	UCCWA	0.15	0.05 - 0.25	8			

Total Hardness (mg/l)	UCCWA	47.2	35.6 - 78.0	3			
Dis. Hardness (mg/l)	UCCWA	55.1	23.7 - 95.6	14			

Table A-4
Interim Effluent Limits Argo Tunnel Discharge

Parameter	Effluent Limit		Rationale
	30-Day Avg.	Daily Max	
Flow, mgd	N/A	1.008	Design Capacity
TSS, mg/l	20	30	Effluent Guidelines
pH, s.u.	N/A	6.0 - 9.0	Effluent Guidelines
Oil and Grease, mg/l (1)	N/A	10	State Effluent Regulations
Copper (TR), mg/l	0.15	0.30	Effluent Guidelines
Zinc (TR), mg/l	0.75	1.5	Effluent Guidelines
Lead (TR), mg/l	0.3	0.6	Effluent Guidelines
Cadmium (TR), mg/l	0.05	0.10	Effluent Guidelines
Whole Effluent Toxicity, Acute	N/A	N/A	State Discharge Regulations

(1) If a visible sheen or floating oil is observed at the discharge point, a sample shall be taken and analyzed.

Table A-5
Potential ARAR Water Quality Standards
(All in µg unless noted below)

Parameter	Aquatic Life Table Value Standards (Dissolved)[2]		Ambient - Based Site Specific Stnd.[1] (Dissolved)	Water Supply (Total Recoverable)	Agricultural (Total Recoverable)	Recreation Class I	Water + Fish (Dissolved)
	Acute	Chronic	Chronic	Acute / Chronic	Chronic	--	Chronic
Aluminum	750	87		-- / --	--	--	--
Antimony	--	--		-- / 6.0	--	--	6
Arsenic	360	150		50 [1] / --	100	--	--
Barium	--	--		1000 / --	--	--	--
Beryllium	--	--		-- / 4.0	100	--	--
Cadmium (6)	1.8	0.66	3[1]	5 / --	10	--	--
Chromium III	984	117		50 / --[1]	100	--	--
Chromium VI	16[1]	11[1]		50 / --	100	--	--
Copper (6)	9.2	6.5	17 [1]	-- / 1000	200	--	--
Iron	--	1000 (TRec)[1]		-- / 300 (dis)[1]	--	--	--
Lead (6)	31.3 [1]	1.5 [1]		50 / --	100	--	--
Manganese	--	1000 (TRec)[1]		-- / 50 (dis.)[1]	200	--	--
Mercury	2.4	.01(tot.)[1]		2.0 / --	--	--	--
Nickel (6)	545 [1]	56.4 [1]		-- / 100	200	--	--
Selenium	20	5	10 (TRec)[1]	-- / 50	20	--	--
Silver (6)	0.62 [1]	0.02 [1]		100 / --	--	--	--
Thallium	--	15		-- / 0.5	--	--	0.5
Uranium (6)	1200	700		--	--	--	--

Table A-5
Potential ARAR Water Quality Standards
(All in µg unless noted below)

Parameter	Aquatic Life Table Value Standards (Dissolved)[2]		Ambient - Based Site Specific Stnd.[1] (Dissolved)	Water Supply (Total Recoverable)	Agricultural (Total Recoverable)	Recreation Class I	Water + Fish (Dissolved)
	Acute	Chronic	Chronic	Acute / Chronic	Chronic	--	Chronic
Zinc (6)	65	59	300	-- / 5000	2000	--	
Ammonia[3] as N (unionized)	TVS[1,4]	0.02 [1]		-- / 0.5	--	--	--
Cyanide - Free[3]	0.005 [1]			0.2 / --	0.2 (acute)	--	--
Fecal Coliform[5]	--	--		--	--	200 [1]	--
D.O.[3]	6.0 [1] 7.0(sp)	--		--	--	--	--
pH (s.u.)	6.5- 9.0 [1]						
Fluoride[3]	--	--		2.0 / --	--	--	--
Sulfate[3]	--	--		-- / 250 [1]	--	--	--
Chloride[3]	--	--		-- / 250 [1]	--	--	--
Nitrate[3]	--	--		10 / -- [1]	100	--	--
Nitrite[3]	--	--		1.0 / -- [1]	10 (acute)	--	--

Foot Notes for Table A-5.

(1) WQS applied to Segment 11.
(2) Table Value Standards (TVS) based on hardness of 50 mg/l as $CaCO_3$
(3) mg/l.
(4) 0.43/FT/FPH/2
(5) no./100 ml.
(6) TVS are hardness based. TVS increse with hardness.

Table A-9
Final Effluent Limits for Argo Tunnel Discharge

Parameter	Effluent Limit		Monitoring Frequency	Sample Type	Rationale
	30-Day Avg	Daily Max			
Flow, mgd	N/A	1.008[3]	Daily	Inst.	Design Capacity
TSS, mg/l	20	30	Weekly	24-hr Comp	Best Professional Judgement, ELG
pH, s.u.	N/A	6.5 - 9.0	Daily	Grab or Inst.	Water Quality Standards
Oil and Grease, mg/l	N/A	10	Daily, Visual	Grab[1]	State Effluent Regulations
Arsenic (Total), µg/l	N/A	50	Weekly	24-hr Comp	Water Quality Standards
Cadmium (TRec.), µg/l	3	5	Weekly	24-hr Comp	Water Quality Standards, BPJ
Copper (TRec), mg/l	17	35	Weekly	24-hr Comp	Water Quality Standards, MT, BPJ
Iron (TRec), µg/l	15800	N/A	Weekly	24-hr Comp	Water Quality Standards
Lead (TRec), µg/l	4.75	219	Weekly	24-hr Comp	Water Quality Standards, DW Advisory, MT
Manganese, (TRec.),µg/l	800	N/A	Weekly	24-hr Comp	Human Health Protection, BPJ
Nickel (TRec.), µg/l	850	N/A	Weekly	24-hr Comp	Water Quality Standards
Silver (TRec.), µg/l	0.02	0.62	Weekly	24-hr Comp	Water Quality Standards
Zinc (TRec.), µg/l	225	N/A	Weekly	24-hr Comp	B. Trout Protection, BPJ
Whole Effluent Toxicity, Acute	N/A	(2)	Quarterly	Grab	State Discharge Regulations

(1) If a visible sheen or floating oil is observed at the discharge point, a sample shall be taken and analyzed.

(2) LC_{50} > 100% at any effluent concentration tested.

(3) Reevaluate discharge limits if capacity exceeds 1.008 mgd.

Table A-10 First Year - Treatment Plant Influent and Effluent Monitoring

September 29, 1998

Influent and Effluent Monitoring Requirements - First Year after start-up *							
Parameter	**Effluent**	**Monitoring Frequency**	**Rationale** (Pollutant Group)**	**Influent**	**Monitoring Frequency**	**Rationale**	**Sample Type**
Flow, mgd	✓	Daily / Continuous	Limit (1)	✓	Daily / Continuous	Perform, Indicator	Instantaneous
pH, s.u.	✓	Daily/ Continuous	Limit (1)	✓	Daily/ Continuous	Indicator	Grab / Instantaneous
Oil and Grease, mg/l	✓	Daily	Limit, Indicator (1)				Daily Visual/Grab
TSS, mg/l	✓	Weekly	Limit, Perform (1)				24-hr. Composite
TDS	✓	Quarterly	Indicator (2/4)	✓	Quarterly	Indicator	Grab
Hardness, mg/l as $CaCO_3$	✓	Weekly	Metals WQS (4)				24-hr. Composite
Whole Effluent Toxicity, Acute	✓	Quarterly	Limit (1)				Grab
Aluminum (TRec.), µg/l	✓	Weekly	Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Arsenic (Total), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Cadmium (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Copper (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Iron (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Lead (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Manganese, (Trec.),µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Nickel (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Silver (TRec.), µg/l	✓	Bi-Monthly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite

Table A-10 First Year - Treatment Plant Influent and Effluent Monitoring
September 29, 1998

Influent and Effluent Monitoring Requirements - First Year after start-up *							
Parameter	**Effluent**	**Monitoring Frequency**	**Rationale** (Pollutant Group)**	**Influent**	**Monitoring Frequency**	**Rationale**	**Sample Type**
Zinc (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Bi-Monthly	Perform, Indicator	24-hr. Composite
Beryllium (TRec), µg/l	✓	Bi-Monthly	Add Info (1/3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Chromium (TRec),µg/l	✓	Bi-Monthly	Add Info (3)		Bi-Monthly	Add Info	24-hr. Composite
Chromium^{6+} (Diss.),µg/l	✓	Bi-Monthly	Add Info (3)		Bi-Monthly	Add Info	Grab
Mercury (Total), µg/l		Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	Grab
Selenium (TRec),µg/l		Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Thallium (TRec),µg/l	✓	Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Uranium (Diss), µg/l	✓	Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Radium 226 and Radium 228, PCi/l		Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Gross Alpha, PCi/l		Bi-Monthly	Add Info (3)	✓	Bi-Monthly	Add Info	24-hr. Composite
Nitrate-N, mg/l	✓	Bi-Monthly	Indicator, Add Info (4)	✓	Bi-Monthly	Indicator, Add Info	Grab
Nitrite-N, mg/l	✓	Bi-Monthly	Indicator, Add Info (4)	✓	Bi-Monthly	Indicator, Add Info	Grab
Ammonia-N, mg/l	✓	Bi-Monthly	Add Info (3)				
Cyanide, WAD µg/l				✓	Bi-Monthly	Indicator, Add Info	Grab
Total Phosphorous, mg/l	✓	Bi-Monthly	Add Info (4)	✓	Bi-Monthly	Add Info	Grab
Chloride, mg/l	✓	Bi-Monthly	Add Info (1/3)		Bi-Monthly	Add Info	24-hr. Composite

Table A-10 First Year - Treatment Plant Influent and Effluent Monitoring
September 29, 1998

Influent and Effluent Monitoring Requirements - First Year after start-up *							
Parameter	**Effluent**	**Monitoring Frequency**	**Rationale** (Pollutant Group)**	**Influent**	**Monitoring Frequency**	**Rationale**	**Sample Type**
Fluoride, mg/l	✓	Bi-Monthly	Add Info (1/3)		Bi-Monthly	Add Info	24-hr. Composite
Sulfate, mg/l	✓	Bi-Monthly	Add Info (1/3)		Bi-Monthly	Add Info	24-hr. Composite

Table A-10 First Year - Treatment Plant Influent and Effluent Monitoring

September 29, 1998

* Monitoring may be modified over time. It is likely that the number of parameters and frequencies of monitoring will be reduced over time.

** Monitoring Rationale:

- Limit - Discharge Limit, ARAR compliance monitoring
- Perform - Data to be used to assess treatment plant performance, % removal , or technology based limit.s.
- Indicator - Indicator of changing conditions in mine drainage
- Add Info - Parameters needing additional information or of interest to watershed community

Pollutant group corresponds to pages 16, 17 and 36 in Part 1 of ACD

(1) Pollutant with limit or considered for limits
(2) No limits or monitoring
(3) Potential pollutants of concern - more data needed
(4) Watershed or indicator pollutants
(1/3) Pollutants evaluated for limits, but later dropped from consideration
(See page 34 in part 1 of ACD)

Bi-Monthly - Every other month (6 times per year)

Table A-11 September 20, 1998

Influent and Effluent Monitoring Requirements - Second and Later Years *							
Parameter	**Effluent**	**Frequency**	**Rationale (Group)***	**Influent**	**Frequency**	**Rationale**	**Sample Type**
Flow, mgd	✓	Daily / Continuous	Limit (1)	✓	Daily / Continuous	Perform, Indicator	Instantaneous/ Continuous
pH, s.u.	✓	Daily/ Continuous	Limit (1)	✓	Daily/ Continuous	Indicator	Grab
Oil and Grease, mg/l	✓	Daily	Limit, Indicator (1)				Daily Visual/Grab
TSS, mg/l	✓	Weekly	Limit, Perform (1)				24-hr. Composite
TDS	✓	Quarterly	Indicator (2/4)	✓	Quarterly	Indicator	Grab
Hardness, mg/l as $CaCO_3$	✓	Weekly	Metals WQS (4)				24-hr. Composite
Whole Effluent Toxicity, Acute	✓	Quarterly	Limit (1)				Grab
Aluminum (TRec.), µg/l	✓	Weekly	Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Arsenic (Total), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Cadmium (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Copper (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Iron (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Lead (TRec), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Manganese, (TRec.),µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Nickel (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Silver (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Zinc (TRec.), µg/l	✓	Weekly	Limit, Perform (1)	✓	Quarterly	Perform, Indicator	24-hr. Composite
Nitrate-N, mg/l				✓	Quarterly	Indicator	Grab

Influent and Effluent Monitoring Requirements - Second and Later Years *							
Parameter	**Effluent**	**Frequency**	**Rationale (Group)***	**Influent**	**Frequency**	**Rationale**	**Sample Type**
Nitrite-N, mg/l				✓	Quarterly	Indicator	Grab
Cyanide, WAD µg/l				✓	Quarterly	Indicator	Grab

Table A-12
Clear Creek Instream Monitoring Requirements

Parameter	Upstream SW-07a	Downstream SW-05	Monitoring Frequency *		Sample Type
			Year 1	Year 2 & later	
Flow, cfs	✓	✓	Bi-Monthly	Quarterly	Grab
pH, s.u.	✓	✓	Bi-Monthly	Quarterly	Grab
Hardness, mg/l as $CaCO_3$	✓	✓	Bi-Monthly	Quarterly	Grab
Alkalinity, mg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Aluminum (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Aluminum (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Arsenic (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Arsenic (Total), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Cadmium (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Cadmium (Diss.) µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Copper (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Copper (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Iron (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Iron (Diss), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Lead (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Lead (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Manganese (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Manganese (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Nickel (TRec.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Nickel (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Silver (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Silver (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Thallium (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Thallium (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Zinc (TRec), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab

Table A-12
Clear Creek Instream Monitoring Requirements

Parameter	Upstream SW-07a	Downstream SW-05	Monitoring Frequency *		Sample Type
			Year 1	Year 2 & later	
Zinc (Diss.), µg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Total Phosphorous, mg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Nitrate-N, mg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Nitrate-N, mg/l	✓	✓	Bi-Monthly	Quarterly	Grab
Ammonia-N, mg/l	✓	✓	Bi-Monthly	Quarterly	Grab
The following parameters will not be monitored after the first year.					
Beryllium (TRec), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Beryllium (Diss), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Chromium (TRec), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Chromium (Diss), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
$Chromium^{6+}$ (Diss), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Mercury (T), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Mercury (Diss.),µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Selenium (TRec), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Selenium (Diss.), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Uranium (Diss.), µg/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Radium 226 and 228, pCi/l	✓	✓	Bi-Monthly	Not Monitored	Grab
Gross Alpha, pCi/l	✓	✓	Bi-Monthly	Not Monitored	Grab

* Monitoring may be modified over time. It is likely that the number of parameters and frequencies of monitoring will be reduced over time.

RESPONSE TO COMMENTS
ON THE
ARGO TUNNEL TREATMENT PLANT
ARARS COMPLIANCE DOCUMENT

September 30, 1998

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VIII (8EPR-SR)
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

CLEAR CREEK/CENTRAL CITY SUPERFUND SITE
IDAHO SPRINGS, COLORADO

CONTENTS

This document is the response to public comments received on the November 24, 1997, draft *ARARs Compliance Document (ACD) for Argo Tunnel Treatment Plant*. There are three sections in this response to comments:

A. Summary of Public Participation;
B. Response to Comments; and
C. Major Changes Made to Argo ACD Since November 24, 1997 Draft.

Copies of the comment letters and specific responses are included in Section B. Changes made to the draft document as a result of public comment are also discussed in Section B. Some additional changes have been made to the ACD as a result of additional EPA and State review. All major changes made since the November 24, 1997 draft are listed in Section C. Minor changes such as editorial, or minor rewrites to improve clarity, are not listed.

A. SUMMARY OF PUBLIC PARTICIPATION

The draft ARARs compliance document was announced for public comment on November 24, 1997. EPA sent out notices of the public comment to about forty people on the Clear Creek Superfund mailing list. The addresses were selected because they were in or near Idaho Springs, or because they were operators of water treatment plants or Clear Creek water users. Also on November 24, fifteen copies of the entire ACD were sent out to interested parties, such as Cyprus and Golden. An advanced notice of the public comment period was sent on November 21, 1997, to members of the Upper Clear Creek Watershed Association (UCCWA). The members of the Upper Clear Creek Watershed Association were identified as the most interested group of stakeholders because most of the members operate waste water treatment plants, represent governments which use Clear Creek water, or are located close to the Argo Tunnel.

On December 9, 1997, EPA presented a summary of the Argo Tunnel Superfund compliance document at the regularly scheduled meeting of the Upper Clear Creek Watershed Association. After a question and answer period about the Superfund compliance document, the Association asked for additional public participation, such as an additional public meeting. The main issue raised during the Association meeting was concern over the lack of penalty provisions in Superfund lead activities. Most of the Association members have NPDES permits and thought that the State and EPA should have the same Clean Water Act penalty provisions as found under NPDES. EPA explained that the Superfund law did not include penalty provisions for fund lead remedial actions. Several of the members congratulated EPA and the State on the quality of the document and thought that it was well done. One of the other issues that was raised, but was not resolved at the meeting, was the belief that the Superfund compliance document approach was less restrictive or easier to comply with than other requirements. EPA explained that the document was not the same as an NPDES permit, but has equivalent discharge limits. Legally, the document is not a permit. Technically, the ACD is similar to a NPDES permit, written by EPA. NPDES permits vary from state to state, or state to EPA. Therefore, the technical approach of the ACD does not exactly follow the State of Colorado's NPDES approach. There

were also some modifications of the typical NPDES approach. Superfund decided to make several limits more restrictive than necessary under NPDES, zinc for example. Some limits are less restrictive. For example, the 50 µg/l manganese secondary MCL was waived under Superfund. The concerns of some members of the UCCWA that the ACD was less restrictive than an NPDES permit was not not completely resolved during the meeting.

In response to the Upper Clear Creek Watershed Association's request, a second meeting was held on December 16, 1997 from 4 to 7 p.m., at the City of Golden Recreation Center. An open house type meeting was held because of the detailed, technical nature of the document and the lack of broad controversial issues. This forum allowed the public to ask about specific issues of concern. In total, there were seven attendees. The main issues from the open house were questions about the treatment plant such as when would mine drainage treatment start operating and concern about thallium. This comment will be addressed further in the Response to Comments Section, see comment 15. Other attendees at the open house had general questions about other projects in Idaho Springs, or were interested in the Argo Tunnel treatment facilities design and construction.

The public comment period was to have ended Monday, January 29, 1998. During the initial public comment period, five comment letters were received as listed below. However, during the Upper Clear Creek Watershed Association meeting held on January 8, 1998, the Association requested that EPA allow more time to review the Superfund compliance document. As requested, EPA extended the public comment period until the end of January 1998. One additional comment letter was received and it was from the City of Black Hawk.

The Clear Creek Technical Advisory Group (TAG) met with EPA and the State on April 23, 1998, to discuss any remaining concerns about the ACD. The procedures for calculating limits were discussed step-by-step for most metals of concern (i.e. aluminum, cadmium, zinc, manganese). EPA and the State were able to satisfactorily address the TAG's remaining questions and concerns in the April meeting.

COMMENTORS ON THE DRAFT ARGO ACD

1. December 12, 1997, from Holly L.O. Huyck, Upper Clear Creek Watershed Advisory Group.

2. December 19, 1997, from James B. McCarthy, Water Quality/Environmental Services, Public Works Department, City of Arvada.

3. December 28, 1997, from Michael W. Crouse, Hydrologist.

4. December 29, 1997, from Katie Fendel, Upper Clear Creek Watershed Association.

5. December 29, 1997, from the Phil Hegeman and Don Holmer, Permits Unit, Water Quality Control Division, Colorado Department of Public Health and Environment.

6. Comments received during the December 16, 1997, Open House.

7. January 13, 1998, from Gregg Ten Eyck, Chairperson, Upper Clear Creek Watershed Association requesting public comment extension to January 31, 1998.

8. February 3, 1998, from Vince Auriemma, City of Black Hawk.

B. RESPONSE TO COMMENTS

GENERAL COMMENTS

1. We want to thank all the commentors who reviewed the *ARARs Compliance Document* [ACD] and attended the UCCWA meeting and the ACD open house. We appreciate your comments. We also want to thank you for your continued support in constructing the Argo Treatment Plant.

2. *How can we be assured that the plant will continue operating and be in compliance with the ACD?*

   Response: EPA and the Colorado Department of Public Health and Environment are both committed to ensuring continuous operation and compliance with the discharge limits in the Argo ACD. EPA will fund 90%, the State 10%, of the operating costs for the first 10 years. After 10 years, the State will fund 100% of the costs to operate the treatment plant. Both the State and EPA have made arrangements to fund continuous operation of the treatment plant subject to the State legislature and Congress.

   The Argo treatment plant will receive in-depth, continuous scrutiny to assure both proper operation and compliance with the ACD. The State employs a contractor to operate and maintain the treatment plant. As with NPDES discharge permits, the operator of the Argo Treatment Plant will be monitoring the discharge and reporting the results monthly. In addition during the first year(s), EPA and the State will be assessing compliance and performance for almost every monitoring event.

   One difference between NPDES and Superfund enforcement and compliance assurance, is that the Superfund facilities, such as the Argo Tunnel, are not subject to penalties or law suits filed under the Clean Water Act (CWA). Under the Superfund legislation, requirements from other laws which are not directly related to clean up requirements are considered *administrative*. Examples of *administrative* requirements from the NPDES program include: permit applications, 401 certification from the State, and compliance order requirements. The portions of other laws relating to clean-up levels such as (CWA) water quality standards are considered *substantive* and must be complied with by Superfund facilities. Therefore, although Superfund facilities are not subject to the penalty provisions of the CWA, facilities must still comply with the standards and discharge limits based on the CWA programs.

3. *The Superfund ACD process seems to have some flexibility. Are there opportunities for more flexibility in NPDES permits and voluntary clean-ups?*

Response: Unfortunately, neither the Superfund or NPDES Programs offer much flexibility. (See also voluntary clean-ups-response 5 and ARARs waiver-response 10.) Essentially, water quality standards and/or treatment technology standards need to be met by all Superfund or NPDES surface water dischargers. For mine drainage treatment plants such as Argo, the most limiting standards are almost always water quality standards (WQS) for aquatic life (fish). What little flexibility there is in NPDES or Superfund occurs in applying the WQS or modifying the WQS.

4. *Why is not the Argo ACD a Colorado NPDES permit or exactly like an NPDES permit?*

Response: Technically, the ACD is very similar to a NPDES permit. Legally the ACD is not a NPDES permit. The reasons for the differences are listed below:

a. The Argo Tunnel treatment plant is a Superfund Remedial action. Under Superfund, clean-up actions conducted *on-site* do not need permits such as NPDES. This means the ACD is not an NPDES permit. However, an ACD was written to show compliance with the *substantive* requirements of the NPDES program. The document is a combination of the discharge and monitoring requirements of Superfund and NPDES.

b. The Superfund program has taken a more long-term approach to water quality. Typically, in NPDES permits, the limits are based on the standards in effect at the time of permit issuance. For pollutants with ambient water quality based standards, we have chosen to be more protective than required by NPDES procedures. The more stringent effluent limits are in anticipation of improved water quality and possibly revised ambient based water quality standards.

c. All NPDES permits are site specific. If the Argo Tunnel was not a Superfund action and had a NPDES permit, the limits would not be the same as any other mine drainage treatment facilities because of differences in water quality standards, stream and discharge flows, and geology.

d. The State and EPA generally agree about the methods for writing NPDES permits. However, each agency has preferences regarding how NPDES permits are written. Each permit writing agency has its own approach to writing NPDES discharge permits. The *substantive* requirements of NPDES in the ACD follow the EPA Region 8's approach to NPDES permits. Other federally written NPDES permits will have similar differences from other Colorado NPDES permits.

5. *Can the Superfund ACD process be used for more flexibility at voluntary clean-up?*

Response: Finding a workable regulatory approach to voluntary clean-ups has been a major issue for EPA, the State, UCCWA, UCCWAG, etc., for many years. Particularly, there are regulatory issues for voluntary clean-ups of mine drainage discharges. The type of minor flexibility allowed under the Superfund *Remedial* program at the Argo Tunnel would not make it easier to develop voluntary clean-up discharge limits. (It should be noted there are two main Superfund programs: *Remedial* and *Removal*.) Typically, the Superfund *Remedial* program has more requirements and procedures than NPDES, such as water quality ARARs. In general, the combination of the NPDES and WQS programs seem to have slightly more potential flexibility for voluntary clean-ups. There are some benefits to Superfund over NPDES. Superfund actions can provide more liability protection through prospective purchaser agreements, orders or consent decrees.

The Superfund *Removal* program may offer some possibilities for flexibility at voluntary mine clean-up sites. The Lion Creek/Minnesota Mine clean-up was conducted under the Superfund *Removal* program. There would still be some regulatory issues due to the interim nature of removal actions and ownership of any mine discharges. Eventually, additional actions will need to be taken at *removal* sites to full meet ARARs.

Unfortunately, an easy approach is not currently available for voluntary clean-ups of abandoned mine drainage. The proposed "Good Samaritan" amendment to the Clean Water Act would allow voluntary clean-ups to meet less rigorous standards. EPA continues to work with Congress to include the "Good Samaritan" clause into the Clean Water Act. However, at this time it does not appear likely to proceed. Another option which EPA is pursuing is the orphan site program Although it will be difficult to implement the orphan site program on water discharges, it does appear viable for cleaning up tailings and waste rock that has been placed in or near Clear Creek.

6. *The Superfund ACD uses some limit calculation methods which are different from the typical Colorado NPDES permit. Can these different methods be used in NPDES permits?*

Response: In general, the methods used in calculating discharge limits in the Argo ACD can be used in NPDES permits. In fact, the NPDES regulations and guidance are the basis for the Argo limit derivations. However, each permit writing agency has its own specific policy and procedures for writing NPDES permits. Each state or EPA region has a slightly different approach to NPDES. For NPDES dischargers in Colorado (non-federal), the Colorado Department of Public Health and Environment is the lead NPDES agency. Therefore, the State decides which methods will be used in developing Colorado NPDES permits limits.

Listed below in responses 7-11 are discussions of the different approaches used in writing the Argo ACD and a typical Colorado NPDES permit.

7. *Why are the discharge limits for cadimum, copper and zinc more stringent than would be found if an NPDES permit was written for the Argo? What are other differences with typical Colorado NPDES permits?*

Response: The table below predicts discharge limits if the State NPDES unit had written an NPDES permit for the Argo Tunnel. The current water quality standards and discharge limits for the Argo ACD are also listed.

(All in µg/l)	CLEAR CREEK # 11 WQ STANDARDS		POTENTIAL NPDES DISCHARGE LIMITS		ARGO ACD DISCHARGE LIMITS	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
CADMIUM	None	3 dis	None	36 pd	5 tr	3 tr
COPPER	None	17 dis	None	39 pd	None	17 tr
ZINC	None	300 dis	None	434 pd	None	225 tr

dis = dissolved, pd = potentially dissolved, tr = total recoverable analytical methods

Superfund went with more restrictive limits to achieve more clean-up and in anticipation of more restrictive water quality standards in the future for cadmium, copper and zinc. Cadmium, and especially zinc, are the main pollutants of concern for the Superfund clean-up.

There also are more pollutants with limits in the Argo ACD. Typically, Colorado NPDES mine permits have not included limits for aluminum and nickel. Other differences are discussed in the paragraph below.

8. *What is the metals translator used in calculating some discharge limits?*

Response: The metals translator is an approach developed by the NPDES program at EPA to take into account the difference between the amount of total metals in-stream versus the portion of the metals in the dissolved, more toxic form. Typically, for most NPDES dischargers (other than in Colorado), the metals limits are in total recoverable form and the in-stream water quality goals or water quality standards are in dissolved metal form. It appears unlikely that the State of Colorado NPDES program will use the metals translator. The State has already developed permit writing and WQS procedures to accomplish the same translation of dissolved WQS. The State uses the potentially dissolved analytical method to monitor compliance with dissolved metals WQS. Standards have also been modified using the water effects ratio (WER). Like the metals translator, the WER adjusts the standard to take into account the difference in toxicity between dissolved and other forms of pollutants.

9. *Why is the total recoverable analytical method being used instead of the potentially dissolved or dissolved methods?*

Response: Discharge limits for the Argo Tunnel will be analyzed for using the total recoverable analytical method. EPA selected the total recoverable analytical method over the potentially dissolved and dissolved for several reasons. First, the potentially dissolved analytical method does not have an EPA approved procedure. It does not appear that the method could be easily approved, as there are some concerns about the repeatability of the tests depending upon the time allotted for the soft digestion. Also potentially dissolved and dissolved were not used because EPA regulations require that the total recoverable analytical method be used for analyzing metals at 40 CFR Part 122.45(c) (which is another ARAR under Superfund).

EPA also prefers total recoverable over dissolved analytical methods because of variable aquatic chemistry, sediment loads, suspended and particulate metal complexes. We feel the aquatic chemistry is too dynamic to depend on measuring only a portion of the metals in the effluent. By monitoring for the total amount of metals, we believe we have better information on the total amount of pollution in the aquatic environment. By analyzing only for dissolved metals, the total amount will be unknown and suspended metals may become dissolved downstream, impacting water quality. Also, by analyzing only for dissolved metals, the data is less useful when determining the complete in-stream chemical conditions and equilibrium including the portion of metals going into the sediment. It should be noted that for in-stream monitoring, samples will be analyzed by both total recoverable and dissolved methods.

Colorado NPDES prefers the potentially dissolved method. NPDES dischargers that prefer to use the total recoverable analytical method should refer to paragraph 61.8(2)(b)(vii) of the State's Basic Standards and Methodologies for Surface Water for the procedures for requesting alternative methods.

10. *Can NPDES dischargers obtain CERCLA waivers?*

Response: The ACD contains a CERCLA waiver for one of the water quality standards for manganese, an ARAR. CERCLA waivers of ARARs are not available to NPDES dischargers (unless the discharge is also part of a Superfund action). However, NPDES dischargers can request water quality standard (WQS) changes from the Colorado Water Quality Control Commission. There are some similarities between the requirements necessary to change water quality standards and those for obtaining an ARARs waiver. For example, upstream and downstream of the Argo on Clear Creek, dischargers have requested that the manganese standard be increased to reflect existing pollution or new data on the toxicity of manganese to aquatic life. Therefore, although the Superfund waivers are not available to NPDES dischargers, the water quality standard setting process can grant the same kind of relief. See responses 11 and 12 for more information about manganese limits.

11. *Why isn't the Argo manganese limit 50* µg/L?

Response: The segment of Clear Creek at the Argo Tunnel (#11) has a water quality standard of 50 µg/L manganese (Mn). EPA and the State have decided to waive the 50 µg/L standard (ARAR Waiver) because it is not technically feasible to meet the standard instream. The formal ARAR waiver for manganese will be completed this year. Please contact Dana Allen at EPA for more details at (303) 312-6870.

Specifically, limits based on the 50 µg/L standard were not included in the ACD for the following reasons:

a. The 50 µg/L standard is more stringent than needed to protect human health and the environment. The number is based on drinking water system aesthetics. At concentrations above 50 µg/L, manganese may cause a brown/yellow water color or stain laundry or plumbing fixtures. [Note: Water utilities, like Golden, remove manganese as part of the City's drinking water treatment.] The ACD Mn limits are based on 800 µg/L, the level recommended to protect human health. The level needed to protect fish is higher, around 1,000 to 2,000 µg/L.

1. The 50 µg/L Mn WQS will not be achieved instream even if the Argo treatment plant removed 100% of the manganese. Above the Argo Tunnel, manganese already averages around 500 µg/L. The sources of manganese are historic mining and the geology of the region. EPA's water quality modeling has shown that manganese concentrations will be almost the same at Golden whether the Argo Plant treats to 50 or 800 µg/L.

2. The 50 µg/L standard is not typically applied to stream segments in areas with background manganese concentrations. For example, on Clear Creek the dissolved manganese WQS below Golden has just been changed from 50 to 1200 µg/L until the year 2000 and 500 µg/L thereafter. The 50 µg/L standard on the South Platte between Littleton and Denver and below Denver has also been changed to 190 and 400, respectively. Also within the next several years, we anticipate that State and EPA Superfund may approach the Colorado Water Quality Control Commission to change the standard to an ambient or human health-based number such as 800 or 1,000 µg/L.

3. The treatment process to remove zinc and aluminum will not be as efficient if the treatment plant is operated to reduce manganese to 50 µg/L. The plant will treat other pollutants of concern better at moderate manganese discharge levels. Also, magnesium or hardness is removed from the water with manganese. At low hardness, metals are more toxic, so it is better to keep the magnesium in the water.

12. What is the basis of the 800 µg/L manganese limit?

Response: As discussed above, the Argo ACD manganese limit is 800 µg/L. From our analysis, we identified 800 µg/L as the most appropriate criteria at this time to use in setting Argo discharge manganese limits. The 800 µg/L concentration is the chronic manganese level recommended by EPA's drinking water toxicologist to protect human health. The recommendation converts directly into the discharge limit as there is no dilution and the recommendation is in total recoverable form. The 800 µg/l number is not a standard. To date, there is no formal primary drinking water standard (i.e. MCLs) for manganese. The standards/criteria to protect aquatic life are less stringent than 800 µg/L.

The Argo manganese discharge limit is likely to change in the next several years for any one of the following reasons: development of a *treatment technology-based* discharge limit, calculation of a manganese *Total Maximum Daily Load* (TMDL) for Clear Creek, the 50 µg/L WQS may be changed to one based on ambient water quality data or new aquatic or human toxicological data. We recognize that manganese is a very important parameter to drinking water suppliers downstream. Although the manganese standard or load may change in the next several years, we will be removing more than 99% of the manganese from the Argo Tunnel effluent throughout the life of the Argo Treatment Plant.

A manganese *technology-based* discharge limit was not developed in the ACD because there was no no site specific treatment data and we anticipate changes in the standard. It is unlikely that we will have enough data for the treatment plant performance within the first year of operation. Because the plant will operate under interim limits for most of that first year, it will be at least the second year of operation before we have sufficient data to develop a long-term technology-based limit.

13. *How will sludge be disposed? Can sludge be recycled?*

Response: The Argo treatment plant sludge will be disposed of in a landfill in compliance with the State solid waste regulations. The State's operator is planning to dispose of the sludge in the Foothills landfill located in Jefferson County. Sludge disposed of from a Superfund facility must meet ARARS. This means that the sludge must be disposed of in compliance with RCRA subtitles C and D, and State solid waste regulations.

At the open house, a Clear Creek basin mine operator mentioned he has found a company that recycles sludge from his mine drainage treatment plant. He pays a smelter to pick-up and recycle the lime/metal sludge. Like this miner, the State and the Argo treatment plant operator have been investigating other sludge disposal alternatives. However, any Argo sludge disposal option will need to comply with Superfund ARARs, and be cost effective. To date, the best sludge disposal option is a licensed landfill. In the future, we will continue to look for better options such as reusing or recycling. However, to date we

have been unable to find a recycling company willing to take the sludge.

14. *Should there be Total Dissolved Solids (TDS) monitoring and/or limits?*

Response: TDS limits are normally not included in NPDES permits except for highly saline discharges such as oil field waste and at some coal mines which have tapped into briny aquifers. The other instance where salts become a concern is areas such as the Colorado River basin where there is salinity load restriction. At the Argo Tunnel, the discharge is not very saline and many of the ions have specific limits and/or monitoring. Also, the normal policy in NPDES is to include limits only where there is a pollutant that has the potential to exceed water quality requirements or if there is an effluent limit. There are no water quality standards or limits on TDS/salinity for the South Platte basin. For those reasons we did not include a total dissolved solid limit.

Although we do not see the need for a TDS limit; TDS is a useful, inexpensive measurement of ionic activity as mentioned in the comments. We are planning to purchase a TDS meter for use as an indicator of relative ionic activity. Quarterly monitoring will be required in conjunction with Whole Effluent Toxicity (WET) testing. We also anticipate the operator will monitor for TDS as part of operations.

15. *What is the range of thallium concentrations in Clear Creek?*

Response: Clear Creek water users have asked us to look in greater detail into potential thallium concentrations. Several drinking water providers (i.e. Golden) have occasionally found thallium in concentrations that are of concern. They have requested additional Clear Creek water quality sampling for thallium to better quantify levels. EPA has already conducted some additional monitoring for thallium in Clear Creek. No levels of concern were found. To further increase baseline thallium data, additional monitoring has been added to the ACD for thallium.. We will add thallium to the list of metals that will be monitored for the next several years on a quarterly basis in Clear Creek. Also depending upon the analytical results from the treatment plant influent and effluent, we may also add additional thallium monitoring for the effluent. We have not included long term effluent monitoring at this time, because we do not anticipate high levels of thallium from the Argo Tunnel Treatment Plant.

SPECIFIC COMMENTS - LISTED BY LETTER

1 RESPONSE TO COMMENTS
LETTER 1 -- UPPER CLEAR CREEK WATERSHED ADVISORY GROUP

1-1 See general comments 1, 3, 4, and 5.
1-2 See general comments 1, 3, 4, and 5.
1-3 See general comment 2 on compliance.

1-4 The data tables in the Superfund compliance document (Tables A1 through A3) did not include some of the most recent data collected by EPA. This data has been included in our on-going analysis of water quality in Clear Creek. However, the addition of several more data points will not change the qualitative nature of our analysis for determining effluent limits. As described in the ACD, we will be collecting more frequent information in the coming years to be able to fill in data gaps and completely assess upstream and downstream conditions in the immediate vicinity of the Argo Tunnel.

1-5 Thank you for your comment.
1-6 See general comment 14 on TDS.
1-7 Thank you for your comment.

1-8 Ammonia was included in Group 3 for one year of monitoring because it is unlikely that ammonia will be present in the Argo discharge at significant levels. The main reason we included ammonia was to provide baseline data for ammonia, because ammonia can be present as part of the blasting residual of recent mining. We do not anticipate that there has been recent blasting in the area contributing to the Argo Tunnel. However, to confirm our assumption, we are going to monitor for ammonia the first year. If our monitoring finds ammonia at significant levels, we will add additional ammonia monitoring and evaluate whether or not ammonia should be limited.

1-9 Oil & Grease. Footnote 1 in Table A-4 does refer to oil and grease analysis. The oil and grease limit was included for both interim and final effluent limits because the oil and grease limit is a State effluent limit. The monitoring for the oil and grease limit is also a good indicator of changes to the Argo Tunnel discharge. The most likely sources of oil and grease at the Argo Tunnel would be illegal dumping into the mine works draining into the Argo Tunnel. Another more remote possibility is a collapse of the old mine workings, causing old pieces of equipment to leak oil.

1-10 The ACD uses a geometric means of water quality data to determine the Metals Translator. (See general comment 8 for more information about the Metals Translator). As discussed in your letter, the aquatic chemistry in streams such as Clear Creek is highly variable. The chemistry and the ratios between dissolved and total recoverable methods will vary with weather and season. The ratios are also dependent on the type of sediment or suspended material in stream. The Argo treatment plant, on the other hand, needs to be operated in a generally consistent manner, achieving the same discharge limits every

day. It is possible to modify operations for seasonal limits or to take into account some moderate changes in the incoming waste stream. However, overall the treatment plants need to be operated to consistently meet the same parameters or discharge limits. With the dynamic instream conditions and the need to have a consistent discharge limit, we have used a mean for the metals translator to reach a workable solution. The metals translator allows us to calculate consistent discharge limits which will be protective of the instream water quality. The ratio of dissolved metals to total metals used in calculating the limit will not be absolutely correct for parts of the year. In high flow, the ratios tend to be higher than the mean used in the permit, and during periods of low flow the ratios tend to be greater.

1-11 Thank you for your comment.

1-12 We agree with your comment; it would be preferable to use a monitoring point closer to the Argo Tunnel discharge. Unfortunately, the State was not able to develop an intensive monitoring program above and below the Argo Tunnel with all potential pollutants of concern and a sufficient number of monitoring events. We have looked at the several data points that were collected in the RI/FS and subsequent sampling. However, we will not have a complete picture of upstream water quality until we develop a sufficient set of data just upstream of the Argo Tunnel. We have enough data to tell us that background pollutant concentrations will be a major factor and we have found that there is substantial load of zinc that comes in between the typical monitoring point below Chicago Creek and the Argo Tunnel. Because of these difficulties with upstream data, we have chosen, in the ARARs compliance document, to not include some limits, or have developed Best Professional Judgement [BPJ] type limits to take into account some of the uncertainties in the upstream data. By using BPJ, we have been able to incorporate the limited and scattered information at the Argo Tunnel with the bigger data sets further upstream (and downstream).

1-13 Thank you for your comment. We have made some changes to clarify the groups of pollutants and monitoring requirements.

1-14 We have reviewed the modeling results of Dr. Medine. He has recently updated the water quality model of Clear Creek to reflect the discharge limits for selected parameters.

1-15 Thank you for your comment. We will revise these tables and sections to be more consistent. For your information, the term N/A in most NPDES permits means that there is no applicable limit; but the metal is still listed if monitoring is required.

1-16 Thank you for your comment. EPA and the State do plan to use the reopener provisions of this document judicially and will, of course, be documenting any changes that are made to the Argo Tunnel ARARs compliance document.

2 RESPONSE TO COMMENTS
LETTER 2 -- CITY OF ARVADA, PUBLIC WORKS DEPARTMENT

2-1 Thank you for your comment.

2-2 See general comment 13 on sludge disposal.

3 RESPONSE TO COMMENTS
LETTER 3 -- MICHAEL CROUSE, HYDROLOGIST

3-1 The Argo Tunnel Treatment Plant is required to operate continuously (see Part III.C on page 22 of DCM). Even during periods of bypass, the treatment plant will still need to be operated at its full capacity. The philosophy of the Superfund and NPDES programs are to continuously improve water quality in Clear Creek; so for those situations where the zinc concentrations in Clear Creek are below the standard, the plant will continue to operate so that water quality is improved beyond the standard. Also, under the Clean Water Act ARARs, it is not possible to turn treatment plants on and off. The Clean Water Act requires treatment plants to continuously remove pollution. In fact, for many years at the start of the NPDES program there were few water quality based standards. The treatment plants were required to meet treatment technology based limits. Technology limits are based the actual performance of treatment technology for a given industry or waste stream. Now, treatment plants are required to meet the more stringent of water quality or technology based standards.

3-2 As discussed above, the treatment plant will need to operate continuously. The Clean Water Act ARARs require continuous, reasonable levels of treatment at all times, which is also an ARAR (Superfund requirement) for the Argo Tunnel action. There is a possibility of later developing seasonal limits. The treatment plant would still need to operate continuously, but some limits may be changed to take into account season variations. For example, during the spring when the water tends to be cleaner and flows greater, it may be possible to increase discharge limits. To date, those calculations have not been done. We do not expect the treatment plant limits to change greatly for seasonal limits, as the calculations are dependent on the relative changes in hardness and flow. As you may be aware, the metals water quality standards decrease when hardness decreases. During the spring, water in Clear Creek is very soft and the water quality standards are correspondingly more stringent.

4 RESPONSE TO COMMENTS
LETTER 4 - UPPER CLEAR CREEK WATERSHED ASSOCIATION (CITY OF GOLDEN LETTERHEAD)

4-1 You are correct in your observations that EPA and the State were trying to expedite completion of the ARARs compliance document. We had hoped to have the document in place before the Argo Treatment Plant started treating mine drainage. However,

because of construction delays and sludge handling problems that was not possible. We hope you will find our detailed response to comments and the changes made to the document sufficiently thorough. If there are any outstanding concerns, we hope that you will contact us.

4-2 Thank you for your comment.

4-3 See general comments 2 through 10.

4-4 See general comment 2 on compliance.

Anti-backsliding conditions apply to the Argo ARARs compliance document in the same manner as in NPDES. The NPDES permit writing anti-back sliding regulations are ARARs that have to be met under the Superfund action.

4-5 We will be evaluating the data collected as it analyzed and for the entire first year of monitoring in early 1999. We will also be taking a look at the overall site compliance during March 1999. Any new limits that would be necessary as either part of the first year monitoring efforts or the five-year compliance review will be incorporated into the ARARs compliance document.

4-6 The ambient based water quality standards (WQS) in effect since 1989 for Segment 11 of Clear Creek generally includes pollution from the untreated Argo Tunnel. According to Dennis Anderson with CDPHE, WQS Unit, the dissolved zinc WQS of 300 µg/l was based on the 85 percentile of data from the USGS monitoring station above Golden. Segment 11 of Clear Creek is from the Argo Tunnel in Idaho Springs to above Golden.

Ambient based WQS must be considered in determining discharge limits because these WQS are the legally applicable ARARs. Comparable NPDES permit limits would be based solely on the ambient based WQS. We have, however, in most cases, chosen to base the ACD limits on water quality criteria more protective than the current WQS. We have selected more restrictive criteria to be more protective and in anticipation of future WQS changes as water quality improves. For more information on WQS, please contact the State WQS Unit, or the Water Quality Control Commission.

Unfortunately, the Argo Tunnel is not the only source of pollution in Clear Creek. Even with 98-99.7% removal of the metals from the Argo Tunnel discharge, Clear Creek will continue to have elevated metals concentrations. The State and EPA have been investigating the additional metal loadings that enter Clear Creek in Idaho Springs. Preliminary investigations of groundwater in Virginia Canyon did not find a collectable source of metals. The Argo Tunnel Treatment Plant has some capacity (except during spring run-off) to treat contaminated groundwater, if groundwater can be collected. The State and EPA plan to conduct additional investigations to determine if groundwater from Virginia Canyon and other sources in Idaho Springs can be effectively collected and treated.

4-7 See general comment 2 on compliance.

4-8 See general comment 15 on thallium.
4-9 Thank you for your comment.

4-10 Acute Cadmium Limit. We have reconsidered acute cadmium limits and have added a 5.0 µg/L limit based on the drinking water MCL. The ARARs compliance document will be amended to include the acute standard.

4-11 See general comment 12 on manganese.
4-12 See general comments 10 on ARAR waivers and 11 on manganese..
4-13 Thank you for your comment. We have added manganese to this paragraph.

4-14 We have found that six monitoring points are a good balance between cost and a reasonable quantity of data for determining the general range of concentrations for a pollutant. We agree that six data points are not sufficient for reliable averages such as needed for the calculation of limits. As you will note, for parameters which need more statistically reliably results, we have required monitoring for several years. The pollutants with six time monitoring (1st year) are ones which we do not expect to be present at significant levels. We will be checking existing data and assumptions with the six analyses to insure that our initial assumptions are supported by the new data. If the six data points are inconclusive or show that the parameters are present at levels of concerns, additional monitoring will be conducted as described in the reopener provisions of the discharge control mechanism, page 25.

5 RESPONSE TO COMMENTS
LETTER 5. PERMITS UNIT, WATER QUALITY CONTROL DIVISION, COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT.

5-1 We do not anticipate that limits for any other discharges will be affected by the proposed discharge limits in the ARARs Compliance Document. Idaho Springs is the closest facility with an NPDES discharge permit. The City's discharge is limited for copper, mercury and silver. The discharge limits at the Argo will have no effect on the Idaho Springs discharge limits, other than perhaps a slight increase in assimilative capacity for copper. In the future, if a total maximum daily load [TMDL] is developed for metals, there is a possibility that other dischargers will be affected. The most likely class of dischargers affected by metals TMDLs are other mining dischargers in Clear Creek such as the Henderson/Urad Cyprus Amax facility.

5-2 Your comments regarding changes in water quality requirements versus the CERCLA regulations which generally freeze performance criteria (ARARs) at the time of the Superfund ROD (record of decision) illustrates some of the difficulties for Superfund remedial actions for ongoing discharges of pollution. The Superfund law was set up to identify a problem and construct a remedial action to meet the ARARs. The performance standards (ARARs) are identified at the time the decision was made to conduct the

remedial action (OU #3 ROD dated 1991). It was anticipated that the typical Superfund action would be completed within several years of construction. The regulation freezing ARARs at the time of the ROD is to ensure that the remediation could be completed without having to redesign or construct new facilities. This finality is not possible for ongoing discharges such as the Argo. Treatment will need to continue in perpetuity. This creates problems between the one-time clean up approach of Superfund and the continuous NPDES program. Over time, standards for the Argo Tunnel will change. TMDLs will be calculated and revised based on new information. This means Superfund remedial program will need to determine if it is appropriate to incorporate each new standard into the selected Superfund remedy. As you will note throughout the development of the ARARS compliance document, we have included all recent water quality requirements and have tried to anticipate changing requirements. In some cases, however, where the selected remedy has not been designed and constructed to meet the standard, Superfund may not be able to change the remedy to accommodate the new standard. This is particularly an issue when new standards necessitate additional construction, increased costs or there is not a direct benefit to public health and the environment. Superfund may not include these types of new or revised requirements into the ARARs compliance document.

We note the future possibilities of TMDL for: cadmium, copper, iron, lead, manganese and zinc. We anticipate the Argo Treatment Plant should be able to meet potential TMDLs, with the exception of some manganese TMDLs. Both the Argo Tunnel Treatment Plant and the Cyprus Amax Henderson/Urad Mine Drainage Treatment Plant would have difficulty meeting a TMDL based on the 50 µg/l secondary MCL standard. Because of the many unknowns about how loads may be allocated or future changes in standards and loadings, we cannot fully agree to meet all new standards as part of the Superfund removal action, see comment 5-2 above. As mentioned in 5-2, we will try to meet them to best of our ability, and to the extent possible under the Superfund law and regulations.

5-3 See general comment 13 on sludge.

5-4 Thank you for your comment.

5-5 See general comment 14 on TDS.

5-6 Thank you for pointing out the double meaning of our clause. We have amended the section to clarify that the discharge should not degrade existing water quality.

5-7 In developing cadmium, copper and manganese limits, you are correct that mass balance equations were not used. Part one of the ACD, the statement of basis, describes how the limits were derived for each of the pollutants. The best professional judgement (BPJ) method is not typically used in developing water quality based discharge limits by the NPDES unit at the State of Colorado. We used BPJ in developing several effluent limits because we wanted to be: (1) more protective than limits developed by typical NPDES procedure, (2) anticipate changes in WQS or (3) had insufficient data. (See response 7 for more discussion.)

5-8 See general comment 9 on analytical methods.

5-9 Thank you for your comment. We were unaware that the State had changed from the total recoverable site specific standard to the dissolved form for cadmium, copper and zinc. The ACD will be modified to incorporate those changes.

5-10 Thank you for your comment.

5-11 The manganese table on page 28 has been amended to show that the 50 µg/l water quality standard applies to Segment 11.

5-12 See general comment 12 on manganese.
5-13 Thank you for your comment.
5-14 Thank you for your comment.

5-15 Bypass. We appreciate the State's recommendation that best management practices should be developed and followed during bypasses. However, in our studies of Argo Tunnel surge events we have not found any additional best management practices to limit surges. The operator will continue to operate the treatment plant to the best of the Company's ability. However, any discharge from the Tunnel exceeding the treatment capacity and equalization tank storage will be discharged without treatment. Other measures such as plugging the tunnel or reducing flow were analyzed as part of the record of decision and found to be of little benefit when compared to the frequency of surges. There was also strong public opposition to controlling surges by plugging the tunnel, because it was felt to preclude further mining Therefore, the ROD decision was to not treat or contain surges. The decision "not to build special surge control facilities" will be revisited every five years along with the rest of the Clear Creek Superfund site actions. The next review is in 1999. Unless that decision is revised, no further measures will be taken to install facilities to limit bypasses.

It should be noted that, surge events are anticipated to be rare. Prior to the extremely wet year in 1995, we had determined the probability of surges to be around once every five to ten years. Flow conditions observed in 1995, may be an indicator of slightly more frequent surges, however surges beyond the plant capacity should still be rare. The ACD requires daily flow monitoring, so we will be able to tell exactly how many surges occur in the next several years.

Non-surge types of by-passes are prohibited; unless the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; or there were no feasible alternatives to the bypass. Please see the first part of the paragraph 2, on page 7 of the DCM, which prohibits bypasses, except for the limited conditions described in Section III.E.

5-16 We have deleted the Water Quality Control Division's name as reviewer. However, we do appreciate the time that the Permits Unit has spent reviewing the ARARS compliance document.

5-17 Thank you for your comment.

5-18 We understand the State's procedures for determining practical quantitative levels (PQL) for NPDES permits. However, this is another instance where regional permit writers follow a slightly different approach from the State. EPA usually prefers to establish the PQL up front in the permit or ARARs compliance document. In that manner, the discharger knows the necessary level of analytical quality and how the results will be evaluated for compliance.

5-19 Thank you for your editing. We have revised the section accordingly . We have not specified staff by name because duties and staff change over time. We have chosen to refer only by positions and duties. As of this date, the EPA staff member assigned to review WET testing is Glenn Rodriguez in EPA's Ecosystems Protection Group.

5-20 As you have noted in your review, some of the typical NPDES boilerplate clauses have been deleted from the ARARS compliance document. These clauses were not included because there were other regulations under Superfund which superseded the NPDES requirements or the boilerplate sections did not make sense for a Federal/State owned Superfund facility (i.e. property rights clause). For further clarification of these areas, we recommend that you contact Mr. Rob Eber with the State Attorney General's Office.

6 RESPONSE TO COMMENTS FROM OPEN HOUSE
December 16, 1997

6-1 See general comment 15 on thallium.

6-2 The City of Black Hawk will be diverting water from Clear Creek for drinking water below the Argo Tunnel treatment plant. The City's engineer wanted to know if the water treatment would still be necessary to remove manganese and iron after the Argo plant starts treatment. Manganese and iron levels in Clear Creek will be reduced after the Argo treatment plant starts up. However, Black Hawk will still need to remove more manganese and iron to achieve typical drinking water quality.

6-3 See general comment 13, on sludge disposal.

7 RESPONSE TO COMMENTS
LETTER 7 -- UPPER CLEAR CREEK WATERSHED ASSOCIATION

Request for extension of public comment period to January 31, 1998. EPA extended comment period to January 31, 1998 in letter dated February 2, 1998. See the EPA letter (attached) for responses to other concerns.

8 RESPONSE TO COMMENTS
LETTER 8 -- CITY OF BLACK HAWK

We do plan to notify downstream water users of upsets or blow-outs. The State's operator of the Argo plant will notify downstream water users of conditions at the Argo which may effect downstream water users. (ie. by-passes, plant shut down, major upsets, etc.).

U.S. ENVIRONMENTAL PROTECTION
AGENCY, REGION VIII
999 18TH STREET, SUITE 500
DENVER, COLORADO 80202-2466

ARGO TUNNEL
ARARS COMPLIANCE DOCUMENT
Discharge Control Mechanism

**The U.S. Environmental Protection Agency,
Colorado Department of Public Health and the Environment, and CDPHE's Operator of the**

Argo Tunnel Treatment Plant

will be implementing a Superfund Remedial Action that will treat acid mine drainage from the Argo Tunnel and discharge to Clear Creek. The facility is located in Clear Creek County, in Idaho Springs, Colorado.

The treatment plant shall operate in accordance with discharge points, effluent limitations, monitoring requirements and other conditions set forth herein. This discharge control mechanism establishes specific discharge requirements that will comply with the Federal and State applicable or relevant and appropriate requirements (ARARs) discussed in the "Clear Creek Superfund Site Operable Unit #3, Record of Decision," dated September 30, 1991.

These requirements shall become effective February 4, 1999.

Signed this 3rd day of February 1999

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection and
Remediation, Region VIII
Environmental Protection Agency

TABLE OF CONTENTS

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Definitions.

1. The "30-day (and monthly) average" is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms.

2. "Daily Maximum" ("Daily Max") is the maximum value allowable in any single sample or instantaneous measurement.

3. "Composite samples" shall be flow proportioned. The composite sample shall, as a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours nor more than 24 hours. Acceptable methods for preparation of composite samples are as follows:

   a. Constant time interval between samples, sample volume proportional to flow rate at time of sampling;

   b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time the sample was collected may be used;

   c. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every "X" gallons of flow); and,

   d. Continuous collection of sample, with sample collection rate proportional to flow rate.

4. A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

5. An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

6. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based control mechanism effluent limitations because of factors beyond the reasonable control of the Operator. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. Argo Tunnel blow-outs with high flows (>700 gpm) and/or high levels of solids in the influent will be considered upsets. Minor blow-outs and increases in influent solids will not be considered upsets.

7. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Definitions (cont.).

8. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

9. "RPM" means the EPA Remedial Program Manager for the Clear Creek Superfund Site.

10. "EPA" means the United States Environmental Protection Agency.

11. "State Project Officer" or "SPO" means the Colorado Program Manager or Project Officer(s) for the Clear Creek Superfund Site.

12. "Total Recoverable Metals" means that portion of a water and suspended sediment sample measured by the total recoverable analytical procedure described in "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, March, 1979, or its equivalent.

13. "Acute Toxicity" occurs when 50 percent or more mortality is observed for either species (See Part I.E) at any effluent concentrations. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

14. "Operator" means the company or individual that has contracted with the Colorado Department of Public Health and the Environment - Superfund to operate the Argo treatment Plant.

15. "CDPHE" means the Colorado Department of Public Health and the Environment.

16. "EPA Superfund" means the EPA RPMs and/or managers of the EPA's Superfund, Remedial Response Program.

17. "NPDES/Water" means the EPA and/or State NPDES permit writers and managers or the EPA and/or State NPDES permit programs.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

B. Description of Discharge Points

The Superfund Remedial Action at the Argo Tunnel will involve discharges at the locations designated below:

Number	Description of Discharge Point
001	Outfall 001 is the outfall from the Argo Tunnel Treatment plant prior to contact or commingling with any surface or ground water. Outfall 001 will be monitored after the clear well.
002	Outfall 002 is the outfall from the bypass structure which diverts flow from the Argo Tunnel around the Argo Tunnel Treatment plant. Outfall 002 will be monitored in the channel just below the plant intake structure.

C. Interim Limitations

1. During the period beginning immediately and lasting through **90 days** after the treatment plan begins treating water, EPA and CDPHE-Superfund and the Operator will discharge from Outfall 001. Such discharges shall be limited by the Operator as specified below:

   Existing water quality shall not be degraded during construction and treatment equipment startup and testing.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

C. Interim Limitations (Cont.)

2. After the 90-day startup period, and lasting through **October 31, 1998**, EPA and CDPHE-Superfund and the Operator will discharge from Outfall 001. Such discharges shall be limited by the Operator as specified below:

Interim Discharge Limitations		
Parameter	**30-Day Avg. a/**	**Daily Max a/**
Flow, MGD	Report	1.008k/
pH, s.u. g/	N/A	6.5 - 9.0
Oil and Grease, mg/L f/	Report	10.0
Total Suspended Solids, mg/L	20	30
Cadmium, TRec, µg/L j/	50	100
Copper, TRec, µg/L	150	300
Lead, TRec, µg/L	300	600
Zinc, TRec, µg/L	750	1,500
Whole Effluent Toxicity, Acute	-	Report

There shall be no discharge of floating solids or visible foam in other than trace amounts

Footnotes: See page 8

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

D. Final Limitations

1. During the period from **November 1, 1998,** and lasting until the control mechanism is modified or replaced, discharges from Outfall 001 shall be limited as specified below:

Final Discharge Limitations		
Parameter	**30-Day Avg. a/,d/**	**Daily Max a/**
Flow, MGD	Report	1.008 k/
pH, s.u. g/	N/A	6.5 - 9.0
Oil and Grease, mg/L f/	N/A	10.0
Total Suspended Solids, mg/L	20	30
Arsenic, Total, µg/L j/	Report	400
Cadmium, TRec, µg/L	3	5
Copper, TRec, µg/L	17	35
Iron, TRec, µg/L	15,800	Report
Lead, TRec, µg/L	4.75	219
Manganese, TRec, µg/L	800	Report
Nickel, TRec, µg/L	850	Report
Silver, TRec, µg/L b/	0.02	0.62
Zinc, TRec, µg/L	225	Report
Whole Effluent Toxicity, Acute	N/A	LC_{50}>100% h/

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Footnotes: See page 8

2. During the life of the control mechanism, **bypasses are prohibited** except for the limited conditions described in Section III.E. EPA and CDPHE-Superfund and the Operator will discharge during bypass and/or upset conditions through Outfall 002. Discharges from Outfall 002 shall be limited as specified below:

No limits apply to discharges through Outfall 002.

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

Footnotes:

a/ See Definitions, Part I.A. of the control mechanism for definition of terms.

b/ Based on the Methods for Chemical Analyses of Water and Waste 1983 ed., the graphite furnace method (272.2) for silver has a method detection limit of 0.2 ug/L. Based on the Methods for Chemical Analyses of Water and Waste 1983 ed., the cold vapor method (245.1) for mercury has a method detection limit of 0.2 ug/L. Analytical values less than the MDLs should be reported as such and shall be considered to be in compliance with any applicable effluent limitations. For the purpose of this discharge control mechanism, the practical quantitation level for total mercury and total recoverable silver is considered to be 0.6 ug/L. Analytical values less than 0.6 ug/L shall be reported as zero and will be considered to be in compliance with the effluent limitation for total recoverable silver. For averaging calculations of mercury and silver analytical results, measurements less than the practical quantitation level shall be considered as 0.

c/ The hardness shall either be directly measured or be calculated from the monitoring data for total calcium and magnesium and samples shall be taken when ambient (instream) sampling is conducted.

d/ For averaging calculations of analytical results (except Hg, Ag), measurements less than the detection limit shall be considered one half the detection limit.

e/ The monitoring frequencies may be revised upon agreement of EPA and CDPHE and modification of the control mechanism.

f/ A grab sample shall also be taken if a visual sheen is observed.

g/ Daily minimum - daily maximum limitation.

h/ Effective November 1, 1998, there shall be no acute toxicity in the discharges from Outfall 001.

I/ Free cyanide samples shall be analyzed using ASTM D2306-81 Method C (WAD).

j/ Diss. - Dissolved
TRec - Total Recoverable
WAD - Weak Acid Dissociable

Bimonthly - Every other month, total of 6 times per year

k/ Flow is not a limit. If plant capacity regularly exceeds 1.008 mgd, discharge limits will need to be reevaluated.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements

1. Interim Effluent (First Year) Monitoring Requirements

Beginning **October 1, 1998** and lasting through **September 30, 1999,** discharges from Outfall 001 shall be monitored by the Owner or Operator as specified below:

Interim Effluent Monitoring Requirements through 9/30/99		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Flow, MGD	Daily	Instantaneous
pH, s.u.	Daily	Inst. Or Grab
Oil and Grease, mg/L f/	Daily Visual	Grab
Hardness, mg/L as $CaCO_3$ c/	Weekly	24-hr. Comp.
Total Suspended Solids, mg/L	Weekly	24-hr. Comp.
Aluminum, TRec, µg/L j/	Weekly	24-hr. Comp.
Arsenic, Total, µg/L	Weekly	24-hr. Comp.
Cadmium, TRec, µg/L	Weekly	24-hr. Comp.
Copper, TRec, µg/L	Weekly	24-hr. Comp.
Iron, TRec, µg/L	Weekly	24-hr. Comp.
Lead, TRec, µg/L	Weekly	24-hr. Comp.
Manganese, TRec, µg/L	Weekly	24-hr. Comp.
Nickel, TRec, µg/L	Weekly	24-hr. Comp.
Silver, TRec, µg/L b/	Weekly	24-hr. Comp.
Thallium, TRec, µg/L	Bimonthly	24-hr. Comp.
Zinc, TRec, µg/L	Weekly	24-hr. Comp.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements

1. Interim Effluent Monitoring Requirements (cont.)

Interim Effluent Monitoring Requirements through 9/30/99		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Beryllium, TRec, µg/L	Bimonthly	24-hr. Comp.
Chromium , TRec, µg/L	Bimonthly	24-hr.Comp.
Chromium^{6+} , Diss., µg/L	Bimonthly	Grab
Uranium, Diss., µg/L	Bimonthly	Grab
Nitrate-N, mg/L	Bimonthly	Grab
Nitrite-N, mg/L	Bimonthly	Grab
Ammonia-N, mg/L	Bimonthly	Grab
Total Phosphorous-P, mg/L	Bimonthly	24-hr. Comp.
Chloride, mg/L	Bimonthly	24-hr. Comp.
Sulfate, mg/L	Bimonthly	24-hr. Comp
Fluoride, mg/L	Bimonthly	24-hr. Comp.
TDS	Quarterly	Grab
Whole Effluent Toxicity, Acute	Quarterly	Grab

Footnotes: See page 8

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

2. Final Effluent Monitoring Requirements

During the period from **October 1, 1999** and lasting until the control mechanism is modified or replaced, discharges from Outfall 001 shall be monitored by the Owner or Operator as specified below:

Final Effluent Monitoring Requirements		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Flow, MGD	Daily	Instantaneous
pH, s.u. g/	Daily	Grab or Inst.
Oil and Grease, mg/L f/	Weekly Visual	Grab
Hardness, mg/L as $CaCO_3$ c/	Weekly	24-hr. Comp.
Total Suspended Solids, mg/L	Weekly	24-hr. Comp.
Aluminum, TRec, µg/L j/	Weekly	24-hr. Comp.
Arsenic, Total, µg/L	Weekly	24-hr. Comp.
Cadmium, TRec, µg/L	Weekly	24-hr. Comp.
Copper, TRec, µg/L	Weekly	24-hr. Comp.
Iron, TRec, µg/L	Weekly	24-hr. Comp.
Lead, TRec, µg/L	Weekly	24-hr. Comp.
Manganese, TRec, µg/L	Weekly	24-hr. Comp.
Nickel, TRec, µg/L	Weekly	24-hr. Comp.
Silver, TRec, µg/L b/	Weekly	24-hr. Comp.
Zinc, TRec, µg/L	Weekly	24-hr. Comp.
TDS	Quarterly	Grab
Whole Effluent Toxicity, Acute	Quarterly	Grab

Footnotes: See page 8

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

3. Influent Monitoring

Beginning **October 1, 1998** and lasting until the control mechanism is amended or replaced, the Owner or Operator shall monitor the influent to the treatment plant as specified below:

Influent Monitoring Requirements		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Flow, MGD	Daily	Instantaneous
pH, s.u.	Daily	Cont./Grab
TDS	Quarterly	Grab
Aluminum, TRec, µg/L j/	Bimonthly/Quarterly[1]	24-hr. Comp.
Arsenic, Total, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Cadmium, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Copper, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Iron, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Lead, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Manganese, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Nickel, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Silver, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Zinc, TRec, µg/L	Bimonthly/Quarterly	24-hr. Comp.
Nitrate-N, mg/L	Bimonthly/Quarterly	Grab
Nitrite-N, mg/L	Bimonthly/Quarterly	Grab
Cyanide, WAD, µg/L l/	Bimonthly/Quarterly	Grab

[1] Bimonthly (10/98-9/99); Quarterly in later years (10/99 and later).

Footnotes: See page 8

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

4. Additional First Year Influent Monitoring

Starting **October 1, 1998,** and lasting for one full year, the Owner or Operator shall monitor the following parameters at the influent to the treatment plant and Outfall 001 on a bimonthly basis until six sets of data are available. Parameters shall be analyzed using the methods specified below. Parameter concentrations shall be reported in the units specified below. The data is to be submitted as an attachment to the Discharge Monitoring Report. Analytical detection limits shall be at or below Colorado State water quality standards.

First Year Monitoring Requirements		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Beryllium , TRec, , µg/L j/	Bimonthly	24-hr.Comp.
Mercury , Total, µg/L b/	Bimonthly	24-hr.Comp.
Selenium , TRec, µg/L	Bimonthly	24-hr.Comp.
Thallium , TRec, µg/L	Bimonthly	24-hr.Comp.
Ammonia-N, mg/L	Bimonthly	Grab
Uranium , Diss., mg/L	Bimonthly	Grab
Radium 226 and Radium 228, pCi/L	Bimonthly	Grab
Gross Alpha, pCi/L	Bimonthly	Grab

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

5. Long term Upstream and Downstream Water Quality Monitoring of Clear Creek at Stations **SW-7a** at the 23rd Street bridge and **SW-05** at the Gilson Street bridge.

Starting within one month of the control mechanism effective date, the Owner or Operator will monitor the following parameters on a bimonthly basis for the first year and on a quarterly basis for the remaining term of the control mechanism at Stations **SW-7a** (upstream) and **SW-05** on Clear Creek. Instream winter/spring monitoring need only be conducted when the stream is open and it is safe to sample. The data are to be submitted as an attachment to the Discharge Monitoring Report.

Long Term Instream Monitoring Requirements		
Parameter	Frequency a/,c/	Sample Type a/
Aluminum, TRec, µg/L j/	Bimonthly/Quarterly[1]	Grab
Aluminum, Diss., µg/L	Bimonthly/Quarterly	Grab
Arsenic, Total, µg/L	Bimonthly/Quarterly	Grab
Arsenic, Diss., µg/L	Bimonthly/Quarterly	Grab
Cadmium , TRec, µg/L	Bimonthly/Quarterly	Grab
Cadmium , Diss., µg/L	Bimonthly/Quarterly	Grab
Copper, TRec, µg/L	Bimonthly/Quarterly	Grab
Copper, Diss., µg/L	Bimonthly/Quarterly	Grab
Iron, TRec, µg/L	Bimonthly/Quarterly	Grab
Iron, Diss., µg/L	Bimonthly/Quarterly	Grab
Lead, TRec, µg/L	Bimonthly/Quarterly	Grab
Lead, Diss., µg/L	Bimonthly/Quarterly	Grab
Manganese , TRec, µg/L	Bimonthly/Quarterly	Grab
Manganese , Diss., µg/L	Bimonthly/Quarterly	Grab

[1] Bimonthly/Quarterly - Bimonthly, (10/98-9/99); Quarterly in later years (10/99 and later).

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

5. (Continued) Long term Upstream and Downstream Water Quality Monitoring of Clear Creek at Stations **SW-7a** at the 23rd Street bridge and **SW-05** at the Gilson Street bridge.

Long Term Instream Monitoring Requirements (continued)		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Nickel , TRec, µg/L j/	Bimonthly/Quarterly	Grab
Nickel , Diss., µg/L	Bimonthly/Quarterly	Grab
Silver , TRec, µg/L b/	Bimonthly/Quarterly	Grab
Silver , Diss., µg/L b/	Bimonthly/Quarterly	Grab
Thallium , TRec, µg/L	Bimonthly/Quarterly	Grab
Thallium , Diss., µg/L	Bimonthly/Quarterly	Grab
Zinc , TRec, µg/L	Bimonthly/Quarterly	Grab
Zinc , Diss., µg/L	Bimonthly/Quarterly	Grab
Total Phosphorous-P, mg/L	Bimonthly/Quarterly	Grab
pH, s.u.	Bimonthly/Quarterly	Grab.
Nitrate-N, mg/L	Bimonthly/Quarterly	Grab
Nitrate-N, mg/L	Bimonthly/Quarterly	Grab
Ammonia-N, mg/L	Bimonthly/Quarterly	Grab
Flow, cfs	Bimonthly/Quarterly	Grab
Alkalinity, mg/L	Bimonthly/Quarterly	Grab
Hardness, mg/L as $CaCO_3$	Bimonthly/Quarterly	Grab

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

6. Starting in **October 1, 1998**, additional first year (10/98-10/99) Upstream and Downstream Water Quality Monitoring of Clear Creek at Stations **SW-7a** at the 23rd Street bridge and **SW-05** at the Gilson Street bridge.

First Year Instream Monitoring Requirements		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Beryllium , TRec, µg/L j	Bimonthly	Grab
Beryllium , Diss., µg/L	Bimonthly	Grab
Chromium , TRec, µg/L	Bimonthly	Grab
Chromium (Diss), µg/L	Bimonthly	Grab
$Chromium^{6+}$ (Diss), µg/L	Bimonthly	Grab
Mercury (Total), µg/Ll b/	Bimonthly	Grab
Mercury , Diss., µg/Ll b/	Bimonthly	Grab
Selenium , TRec, µg/L	Bimonthly	Grab
Selenium , Diss., µg/L	Bimonthly	Grab
Uranium , Diss., µg/L	Bimonthly	Grab
Radium 226 and Radium 228, pCi/L	Bimonthly	Grab
Gross Alpha, pCi/L	Bimonthly	Grab

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

7. Bypass Monitoring Requirements (Outfall 002)

Beginning at the initiation of treatment and lasting until the control mechanism is amended or replaced, the Owner or Operator shall monitor bypasses of the treatment plant through Outfall 002 as specified below:

Bypass Monitoring Requirements		
Parameter	**Frequency a/,e/**	**Sample Type a/**
Flow, MGD	Daily	Instantaneous
pH, s.u. g/	Daily	Grab or Inst.
Oil and Grease, mg/L f/	Weekly Visual	Grab
Total Suspended Solids, mg/L	2X/Month	24-hr. Comp.
Aluminum, TRec, µg/L j/	2X/Month	24-hr. Comp.
Arsenic, Total, µg/L	2X/Month	24-hr. Comp.
Cadmium, TRec, µg/L	2X/Month	24-hr. Comp.
Copper, TRec, µg/L	2X/Month	24-hr. Comp.
Iron, TRec, µg/L	2X/Month	24-hr. Comp.
Lead, TRec, µg/L	2X/Month	24-hr. Comp.
Manganese, TRec, µg/L	2X/Month	24-hr. Comp.
Nickel, TRec, µg/L	2X/Month	24-hr. Comp.
Silver, TRec, µg/L b/	2X/Month	24-hr. Comp.
Zinc, TRec, µg/L	2X/Month	24-hr. Comp.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

8. Whole Effluent Toxicity Testing - Acute Toxicity

Starting on **January 1, 1998**, the Owner or Operator shall conduct quarterly acute toxicity tests on a grab sample of the discharge from Outfall 001 using a full effluent dilution series [100%, 75%, 50%, 25%, 12.5%, 6.25%, and 0% (control)]. If acute toxicity is detected, additional samples and different dilutions may be required by either EPA Region VIII or CDPHE-Superfund (see below). If such additional sampling is required, the Operator shall promptly comply with the requests.

The replacement static acute toxicity tests shall be conducted in accordance with the procedures set out in the latest revision of "Methods of Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms" EPA-600/4-90/027 (Rev. August 1993) and the "Region VIII EPA NPDES Acute Test Conditions - Static Renewal Whole Effluent Toxicity Test." In the case of conflicts, the Region VIII procedures will prevail. The Owner or Operator shall conduct the acute 48-hour static toxicity test using *Ceriodaphnia dubia* and the acute 96-hours static toxicity test using *Pimephales promelas*.

Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. If more than 10% control mortality occurs, the test shall be repeated until satisfactory control survival is achieved, unless a specific individual exception is granted by EPA Region VIII or CDPHE-Superfund.

After **November 1, 1998**, if acute toxicity occurs, an additional test shall be conducted within four weeks of the date of the initial sample. If only one species fails, retesting may be limited to this species. Should toxicity occur in the second test, testing shall occur once a month until further notified by EPA Region VIII or CDPHE-Superfund.

Quarterly test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting calendar quarter (e.g., whole effluent results for the calendar quarter ending March 31 shall be reported with the DMR due April 28, with the remaining reports submitted with DMRs due each July 28, October 28, and January 28). Quarterly test results shall be reported along with the DMR submitted for the month at the end of the calendar quarter. The format for the report shall be consistent with the latest revision of the "Region VIII Guidance for Acute Whole Effluent Reporting" and shall include all chemical and physical data as specified.

I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Cont.)

E. Self-Monitoring Requirements (Cont.)

8. Whole Effluent Toxicity Testing - Acute Toxicity (Cont.)

If the results for four consecutive quarters of testing indicate no acute toxicity, EPA Region VIII and CDPHE may agree to modify the control mechanism to allow a reduction in the dilution series or testing on only one species.

9. Toxicity Identification Evaluation (TIE)
Toxicity Reduction Evaluation (TRE)

Should acute whole effluent toxicity be detected in the discharge, a TIE-TRE shall be undertaken by the Owner or Operator to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for the toxicity. Failure to initiate or conduct an adequate TIE-TRE, or delays in the conduct of such tests, shall not be considered a justification for noncompliance with the whole effluent toxicity limits contained in Part I.D.1. of this control mechanism.

10. Chronic Toxicity Limitation-Reopener Provision

This control mechanism may be reopened and modified to include chronic whole effluent toxicity limitations if other information or data are developed indicating that chronic whole effluent toxicity limits are needed to meet the substantive requirements of 40 CFR 122.44 (d). (See also Part IV.M. of this control mechanism for additional whole effluent toxicity reopener provisions.)

If acceptable to EPA Region VIII and CDPHE-Superfund, and if in conformance with current regulations, this control mechanism may be reopened and modified to incorporate TRE conclusions relating to additional numeric limitations, a compliance schedule, and/or modified whole effluent toxicity test protocol.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling. Effluent samples taken to comply with the monitoring requirements established under Part I shall be collected from the effluent stream prior to discharge into the receiving waters. All effluent, influent by-pass, stream samples, and measurements shall be representative of the volume and nature of the monitored source.

B. Monitoring Procedures. Monitoring shall be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this control mechanism. Method 272.2 (graphite furnace) and method 245.1 (cold vapor), as listed in the Methods for Chemical Analyses of Water and Wastes 1983 ed., are the required methods for analysis of silver and mercury, respectively.

C. Reporting of Monitoring Results. Effluent monitoring results obtained during the previous month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. If no discharge occurs during the reporting period, "no discharge" shall be reported. Whole effluent toxicity (biomonitoring) results must be reported on the most recent version of EPA Region VIII's Guidance For Whole Effluent Reporting. Influent, by-pass, and instream monitoring shall be summarized and submitted with the next month's DMR. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part IV.), and submitted to the EPA Region VIII-Superfund and the CDPHE-Superfund at the following addresses:

original to: Colorado Department of Public Health and the Environment
HMWMD-RP-B2 (Remedial Programs Section)
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

copy to: U.S. Environmental Protection Agency
Region VIII (8EPR-SR), Clear Creek RPM
~~999 18th Street, Suite 500~~ 1595 Wynkoop St
Denver, Colorado 80202-~~2466~~ 1129

D. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this control mechanism shall be submitted no later than 14 days following each schedule date.

E. Additional Monitoring by the Owner or Operator. If the Owner or Operator monitors any pollutant more frequently than required by this control mechanism, using test procedures approved under 40 CFR 136 or as specified in this control mechanism, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated on the DMR.

F. Records Content. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The initials or name(s) of the individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The time(s) analyses were initiated;
5. The initials or name(s) of individual(s) who performed the analyses;
6. References and written procedures, when available, for the analytical techniques or methods used; and,
7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS (Cont.)

G. Retention of Records. The Owner or Operator shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by this control mechanism, for six years or until the five year reassessment of the Superfund remedy is completed which ever is longer. Data collected on site, copies of Discharge Monitoring Reports, and a copy of this control mechanism must be maintained on site during the duration of activity at the facility or until otherwise instructed by the SPO.

H. Twenty-four Hour Notice of Noncompliance Reporting.

1. CDPHE's Operator shall report any noncompliance which may seriously endanger health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the Operator first becomes aware of the circumstances. The report shall be made to the EPA Region VIII Emergency Preparedness, Assessment and Response Program at (303) 293-1788 and the State of Colorado at (303) 756-4455.

2. The following occurrences of noncompliance shall be reported by telephone to the State of Colorado, HMWMD-RP-B2 (Remedial Programs Section) at (303) 692-3300 and the EPA, Region VIII, Superfund Remedial Program at (303) 312-6870 by the first workday (8:00 a.m. - 4:30 p.m. Mountain Time) following the day the Operator becomes aware of the circumstances:

   a. Any unanticipated bypass which exceeds any effluent limitation in the control mechanism (see Part III.E., Bypass of Treatment Facilities) including any by-pass discharge from Outfall 002;

   b. Any upset which exceeds any effluent limitation in the control mechanism (see Part III.F., Upset Conditions.); or,

   c. Violation of a maximum daily discharge limitation for any of the pollutants listed in the control mechanism are to be reported within 24 hours.

3. A written report shall also be provided within five days of the time that CDPHE's Operator becomes aware of the circumstances. The written report shall contain:

   a. A description of the noncompliance and its cause;
   b. The period of noncompliance, including exact dates and times;
   c. The estimated time noncompliance is expected to continue if it has not been corrected; and,
   d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

4. The RPM and the State Project Officer may waive the written report on a case-by-case basis if the oral telephone report has been received within 24 hours by the EPA-Superfund or CDPHE-Superfund by phone, at (303) 312-6870 or (303) 692-3300.

5. Reports shall be submitted to the addresses in Part II.C., Reporting of Monitoring Results.

I. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II.C. are submitted. The reports shall contain the information listed in Part II.H.3.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. CDPHE will ensure that its Operator of the treatment plan has a contractual duty to comply with all terms and conditions of this control mechanism and as it may be modified in writing. EPA-Superfund and/or CDPHE-Superfund will follow-up on any noncompliance. CDPHE-Superfund and the Operator shall give advance notice of any planned changes at the Argo Tunnel Treatment Plant or of an activity which may result in control mechanism noncompliance to the RPMs and NPDES-Water staff.

B. Duty to Mitigate. CDPHE-Superfund and its Operator shall take all reasonable steps to minimize or prevent any discharge in violation of this control mechanism which has a reasonable likelihood of adversely affecting human health or the environment.

C. Proper Operation and Maintenance. CDPHE's Operator shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Operator to achieve compliance with the conditions of this control mechanism. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar, when the operation is necessary to achieve compliance with the conditions of the control mechanism.

D. Removed Substances. Sludge produced by the treatment system shall be disposed of in compliance with EPA's Superfund off-site disposal policy. The operator will need written approval from the SPO of the off-site disposal site and transportation route.

E. Bypass of Treatment Facilities.

1. CDPHE's Operator may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is also for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. and 3. of this section.

2. Notice.
   a. Anticipated bypass. If CDPHE's Operator knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 60 days before the date of the bypass.
   b. Unanticipated bypass. CDPHE's Operator shall submit notice of an unanticipated bypass as required under Part II.H., Twenty-four Hour Reporting.

3. Bypass is prohibited unless:

   a. Influent flows to the Argo Tunnel Treatment plant exceed the design capacity of the facility (700gpm);

   b. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

   c. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; or

   d. CDPHE's Operator submitted notices as required under paragraph 2. of this section.

III. COMPLIANCE RESPONSIBILITIES (Cont.)

F. Upset Conditions.

If an upset occurs, CDPHE's Operator shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the Operator can identify the cause(s) of the upset;
b. The Argo Tunnel Treatment Plant was at the time being properly operated;
c. The Operator submitted notice of the upset as required under Part II.H., Twenty-four Hour Notice of Noncompliance Reporting; and,
d. The Operator complied with any remedial measures required under Part III.B., Duty to Mitigate.

G. Changes in Discharge of Toxic Substances. CDPHE-Superfund and the Operator shall provide written notification to the RPM of any intent to construct, install, or alter any new process, facility, or activity that is likely to result in a new or altered discharge either in terms of location or effluent quality prior to the occurrence of the new or altered discharge and shall furnish the RPM such plans and specifications which the RPM deems reasonably necessary to evaluate the effect on the discharge and receiving stream.

If the RPM finds that such new or altered discharge might be inconsistent with the conditions of this control mechanism, the RPM in consultation with CDPHE-Superfund and NPDES-Water shall revise the control mechanism to include the new or altered discharge.

IV. GENERAL REQUIREMENTS

A. Planned Changes. CDPHE-Superfund and the Operator shall give notice to the RPM as soon as possible of any planned physical alterations or additions to the Argo Tunnel Treatment Plant. Notice is required only when the alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to all pollutants with or without effluent limitations in the control mechanism.

B. Anticipated Noncompliance. CDPHE's Operator shall give advance notice of any planned changes in the Argo facility or activity which may result in noncompliance with control mechanism requirements.

C. Continuing Discharge Control Mechanism. Under 121(c) of CERCLA, the Argo Tunnel remedy and the discharge control mechanism will be reviewed at least every five years to assure it is protective of human health and the environment. It is anticipated that, at a minimum, these reviews will evaluate the adequacy of the terms and limitations in the control mechanism. The next five year review is March 2004, followed by March 2004. At least 180 days prior to the five year anniversary, CDPHE's Operator and/or CDPHE Superfund shall submit a report detailing any changes made to the treatment plant, influent and effluent analysis (one each) for all metals, and metalloids with water quality standards or criteria, major cations, radionuclides, cyanide, nutrients, nitrate, nitrite and ammonia.

D. Other Information. When CDPHE's Operator becomes aware that it failed to submit any relevant facts, or submitted incorrect information in any report to the SPO or RPM, it shall promptly submit such facts or information.

IV. GENERAL REQUIREMENTS (Cont.)

E. Signatory Requirements. All reports or information submitted to CDPHE-Superfund and EPA by the Operator shall be signed and certified by a duly authorized representative of the Operator.

1. A person is a duly authorized representative only if: the authorization is made in writing and submitted to the State Project Officer, and the authorization specified either an individual or a position having responsibility for the overall operation of the facility or activity, such as the position of plant manager, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

2. Changes to authorization. If an authorization under paragraph IV.E.1. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph IV.E.1. must be submitted to the State Project Officer prior to or together with any reports, information, or applications to be signed by an authorized representative.

3. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete."

F. Availability of Reports. Except for data determined to be confidential business information, under 40 CFR Part 2, all reports prepared in accordance with the terms of this control mechanism shall be available for public inspection at the offices of the Colorado Department of Public Health and the Environment and the EPA Superfund Records Center.

G. Severability. The provisions of this control mechanism are severable, and if any provision of this control mechanism, or the application of any provision of this control mechanism to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this control mechanism, shall not be affected thereby.

H. Transfers. This control mechanism may be automatically transferred to a new Operator upon agreement between EPA-Superfund and CDPHE-Superfund. CDPHE-Superfund will notify the RPM at least 30 days in advance of the proposed transfer date.

IV. GENERAL REQUIREMENTS (Cont.)

L. Reopener Provision. Modification(s) of the control mechanism will be made by EPA-Superfund in consultation with CDPHE-Superfund and NPDES-Water. Any modification(s) could potentially require an explanation of significant differences from the ROD. This control mechanism may be modified pursuant to Part IV.C or as set forth below to include the appropriate effluent limitations (and compliance schedule, if necessary), or other appropriate requirements. This document may be reopened if one or more of the following events occurs:

1. Water Quality Standards: The water quality standards of the receiving water(s) to which the CDPHE's Operator discharges are modified in such a manner as to require different effluent limits than contained in this control mechanism.

2. Wasteload Allocation: A wasteload allocation is developed and approved by the State and/or EPA for incorporation in this control mechanism.

3. Water Quality Management Plan: A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this control mechanism.

4. Monitoring Results: The results of the analysis of the Argo Tunnel Treatment Plant influent and effluent indicate additional parameters of concern.

5. Treatment Technology based limits are developed.

M. Toxicity Limitation-Modification Provision. This control mechanism may be modified to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol, or any other conditions related to the control of toxicants if one or more of the following events occur:

1. Toxicity is detected late in the life of the control mechanism near or past the deadline for compliance.

2. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and EPA and CDPHE agree with the conclusion.

3. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits, and CDPHE and EPA agree that numerical controls are the most appropriate course of action.

4. Following the implementation of numerical controls on toxicants, CDPHE and EPA agree that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically.

5. The TRE reveals other unique conditions or characteristics which, in the opinion of EPA and CDPHE, justify the incorporation of unanticipated special conditions in the control mechanism.